

# FLIGHT

The  
AIRCRAFT  
ENGINEER  
&  
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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## Flight

The Aircraft Engineer and Airships

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### DIARY OF FORTHCOMING EVENTS.

Club Secretaries and others desirous of announcing the date of important fixtures are invited to send particulars for inclusion in the following list:

Nov. ....	Entrance Examination for R.A.F. College.
Nov. 7-15 ..	Olympia Motor Car Show.
Dec. 3 ....	"The Air Force." Lecture by Air-Commodore H. R. Brooke-Popham before R.U.S.I.
Dec. 19 to ...	Paris Aero Show.
Jan. 4, 1920.	
July, 1920	S.B.A.C. International Aero Exhibition at Olympia

## EDITORIAL COMMENT

**A**FTER all the rumours that have been current about the naval wing of the R.A.F. reverting to the administrative control of the Admiralty, it is reassuring to know that nothing of the sort is to happen—at least, in the immediate future. Indeed, from the terms of an official communication recently published it seems to be reasonably clear that it is not even in contemplation in official circles. By the terms of the announcement in question, it is laid down that all air units working with the Navy, including airships under naval control, will, in future, be centralised under the command of an R.A.F. officer, with the

title of Air Officer Commanding the Coastal Area, whose headquarters will be at Thurloe Place, Kensington. The duties of this officer will include the command of all air units in the United Kingdom working with the Navy, with the exception of *personnel* embarked in ships of the Fleet. He will act as adviser to the Admiralty in the first instance on all questions relating to aerial naval policy (the Chief of the Air Staff acting as chief adviser); and he will also act as adviser to the naval commanders-in-chief at the various home stations. He is to be directly responsible to the Air Ministry for the conduct of training, but will keep in close touch with the Admiralty to ensure that the views of My Lords receive at all times adequate consideration, and he will also be responsible to the Air Ministry on all questions of supply and maintenance of air units working with the Navy in home waters.

This arrangement forms a very effective *liaison* between the R.A.F. and the Admiralty, and seems to be, in theory, as nearly ideal as it is possible for such arrangements to be. It ensures that air units working with the Navy shall remain integrally and administratively under the sole authority of the Air Ministry, while the necessary latitude of executive command for operations is reserved to commanding officers of ships or squadrons with which air units are working. It is an arrangement on all fours with that advocated in these pages when the recent discussion arose as to the ultimate fate of the naval wing of the R.A.F.

### The Organisation of the Naval Wing

The communication under notice goes on to lay it down that the "coastal area" is to be organised into administrative groups, as follows:—Operational Units in home naval commands, 10th Group and 29th Group. So far as concerns Operational Units in home naval commands, these will continue, as heretofore, to work under the orders of the respective naval commanders-in-chief—and thus under the Admiralty—for all operational purposes. As regards other purposes, they will be under the Air Officer Commanding the Coastal Area. Each commander-in-chief will have the senior combatant air officer in his command as his local adviser, but on more important questions of policy he will refer to the Air Officer Commanding the Coastal Area. The 29th Group will consist of the aircraft embarked

on board His Majesty's ships and their necessary shore bases and establishments, the organisation of the latter being based on existing practice. The group commander will have under his command certain bases for supplying the Fleet. The 10th Group will consist of the R.A.F. establishments maintained for the training of the Royal Air Force and Naval personnel required by R.A.F. units co-operating with the Navy at home and abroad.

This announcement is definite enough to set at rest, once and for all, the plentiful crop of rumours which has been rife as to intrigues within the Admiralty to regain complete administrative control of the Air Service and to put matters back to where they were prior to 1918. Undoubtedly, efforts have been made in certain quarters to get matters restored to the unhappy state which existed before the creation of the R.A.F. as a separate and distinct Service. Evidently they have met with scant success, and it is devoutly to be hoped that we have now heard the last of them. There remains nothing to be done but to congratulate the authorities of the Admiralty and the Air Ministry on the happy issue of the discussions which have led up to so excellent a *modus vivendi*.

#### The London-Cairo Air Route

The statements as to the tragic record of the air route from London to Cairo made by Lieut.-Col. Henderson are so serious that the only ground for satisfaction in connection with them is that Gen. Seely has stated that an enquiry had been ordered before Col. Henderson's statement was published. Briefly, the allegations are that in the last few months eleven airmen have lost their lives while flying Air Ministry machines from England to Egypt, either through failure of their engines while over the Mediterranean or through crashing when landing on unsuitable aerodromes. It is further stated that machines have been despatched on the journey in deplorable condition, after standing for weeks or months in the open at British aerodromes where they have been delivered too late for use in the War.

It is quite clear that these are statements which must be probed to the bottom. Obviously, we cannot commit ourselves to any opinion as to the merits of the statements, particularly as the official assurance has been given that a full enquiry has been ordered. All we can say at the moment is that if enquiry demonstrates that the allegations are true, then the officials or persons responsible should hang for their sins. Whether true or not, there is no getting away from the fact that eleven valuable lives have been lost on this route. Flying has become ordinarily so safe that it might have been thought the Air Ministry would have taken alarm long before the toll of casualties had mounted as it has done, and would have been at some little trouble to find out whether the route was a suitable one, or whether there was anything the matter with the machines before starting on the journey, or if the fatalities were due to the errors of the pilots themselves. But little seems to have been done until the eve of public disclosure, which we cannot help suspecting was foreseen by the Ministry, which then, and only then, bestirred itself to anticipate publicity. As we say, it is not for us to prejudge the results of the forthcoming enquiry, but it is certain the Air Ministry is badly at fault in having taken no measures to discover why the

London-Cairo route was piling up such a tale of casualties. It seems to be necessary to remind the Ministry that we are not now at war, and that the public is no longer satisfied to accept a long list of killed and wounded aviators as the inevitable price to be paid for victory. In time of war we expect these things, and have to take them without question, since human life as such temporarily ceases to have value except to the individuals intimately concerned with each casualty. It is different in time of peace, and the public, as well as the individuals, demand that there shall be no avoidable waste of life in its service, and will hold to a strict account departments and officials who by their neglect of obvious precautions, are the cause of it. In this case, although it is too early to impute specific blame to anyone, it certainly would appear that the enquiry now to be held is woefully belated. Had it been inaugurated three months ago it would have been very different.

#### Startling Charges of Waste and Incompetence

In a series of recently-published articles in the *Morning Post*, a correspondent, who contents himself with the *nom de plume* of "Argonaut," makes a whole volume of sweeping charges of waste and incompetence against the Air Ministry. He alleges that deliveries by contractors of new machines in quantities equal to or even above war consumption were continued well into the summer of this year, and were accompanied by the destruction of new machines, in addition to the scrapping of machines in current use at the time of the Armistice. The method of destruction, it is alleged, was to drench the machine with petrol—as much as 30 to 50 gallons being used to burn it. This sort of thing is said to have gone on daily in the occupied zone, not far from Cologne.

He also purports to give facts about the "scandal" of engine deliveries since the Armistice, and alleges that many hundreds of thousands of pounds have been thrown away by the sheer inept folly of the Air Ministry. Again, he talks about deliveries of spare parts for obsolete engines in many thousands, long after the engines for which they were designed had passed out of service. As a matter of fact, there is not a single item which escapes his censorship, and we must say that he makes out a strong *prima facie* case for the enquiry he demands. But it seems to us that he weakens his own case by studiously refraining from saying where and when all these things occurred, except that he does in his first article say that the machines alleged to have been destroyed in the Cologne area were of the DeH. IX. type. Further than that, the charges are of a very general nature, and are such as anyone with a little inside knowledge, fortified with a good deal of the gossip which has been so rife all through the War period and since, might have brought. We do not say they are not true. Unfortunately, there is only too much reason to think that they rest on a very solid basis of fact, but that does not help very much towards bringing to book those responsible, unless the accuser can fortify his allegations with specific dates and names. Already "Argonaut" has been practically challenged by the Air Ministry to produce his proofs. Immediately on the publication of the first article, the Air Ministry, in an interview between one of its officials and a newspaper representative, said: "The statements are certainly untrue so far as the information of the



## Flight—And the Men



"Flight" Copyright.

L. BAIRSTOW, F.R.S., C.B.E., Expert Adviser in Aerodynamics to the Air Ministry, late Superintendent of Aerodynamics Department, N.P.L.

Ministry goes up to a certain date; but the Ministry has at once instituted enquiries, and without delay, will publish the facts. In the view of the Air Ministry, statements of this character would be much more convincing if they were more definite. Where did these things take place? On what date did they occur? The Ministry would welcome this information, if it exists."

#### Why Not a Public Enquiry?

The *dementi* is, to say truth, not very much more convincing than the general charges to which it refers. It will be observed that there is an important qualification in the words:—"Up to a certain date." These may mean anything, but it is open to the construction that the official who was interviewed was hedging—according to Parliamentary custom, as defined by Lord Weir—with the truth, and that it merely means that nothing of the sort alleged took place before a certain date. We do not say that this is so, but the inference is there to be drawn. There have been so many enquiries and commissions already into various aspects of the War that everyone is

getting rather tired of them, particularly as they none of them seem to lead anywhere. All that happens, as a rule, is that a great deal of time is wasted and everyone concerned is adjudged to have done quite well—and the Report ends with a pious hope that these things will never occur again! Still, there have been so many allegations of millions literally thrown away with both hands by the Air Ministry that it does appear desirable to sift things to the bottom, and to discover whether all this waste was inevitable or not. Unfortunately, all the enquiry in the world will not retrieve the losses of the overburdened taxpayer, but such a Commission of Enquiry as that demanded by the *Morning Post* correspondent should certainly expose many weak points and pitfalls in organisation which might, as a result, be avoided in the future. That it would lead to any unpleasant results to officers or officials guilty of turpitude or incompetence is not to be imagined for a moment—that is seldom the result of these enquiries—and if that is the sole object that "Argonaut" has in mind, we fear he is wasting time and trouble in agitating for it.

#### R.A.F. and the Navy

In connection with the changes which are being made in the home organisation of the R.A.F. units working with the Royal Navy, to which reference is made on p. 1,411, we understand that the first Air Officer Commanding the Coastal Area will be Air Commodore Arthur V. Vyvyan, C.B., D.S.O., who, for the past six months has been in command of R.A.F. units in the Mediterranean.

#### Honours

The following announcement appeared in a supplement to the *London Gazette* of October 23:—

The King has been pleased to give orders for the following appointment for valuable services rendered in connection with the defence of Kut-al-Amarah. Dated June 3, 1919:—

D.S.O.

Capt. S. C. W. Smith, E. Surr. R., Spec. Res. and R.A.F.

#### England-Australia Flight

MAJ.-GEN. SIR F. H. SYKES, G.B.E., K.C.B., C.M.G., Controller-General of Civil Aviation, has received the following message from the Prime Minister of Australia, for transmission to Capt. Matthews, the pilot of the Sopwith Wallaby machine, which left England on Oct. 21 as a competitor in the Australian Commonwealth Government's prize flight.

The message reads:—

"Wish you and Serg. Kay every success in your great adventure. While every one of your fellow-citizens hope that an Australian aviator may be the first to fly from Europe to Australia, and so achieve what will be easily the world's record in aerial navigation, I want you to take no unnecessary risks. Plug on day after day doing your best, but do nothing foolhardy. If you cannot make Australia in thirty days never mind. The main thing is that an Australian should get here first. If you do that you need not worry. Good luck. (Signed) "HUGHES, Prime Minister."

The machine reached Cologne on the afternoon of Oct. 22.

#### British Aeroplane for King Alfonso

THE formal handing-over of a British aeroplane presented to King Alfonso took place on October 24 at the Cuatro-vientos (Four Winds) Aerodrome, among those present being Sir A. H. Hardinge, the British Ambassador, and Lady Hardinge, who named the machine.

#### The Coupe Schneider

AT the meeting of the *Fédération Aéronautique Internationale* in Brussels on October 24 the matter of the Schneider Cup came in for consideration, and it was decided that, although the trophy itself should not be awarded to Janello, in recognition of his fine performance the Aero Club of Italy should be asked to organise next year's race in Italy.

#### New Regulations for Records

AT the meeting of the F.A.I. at Brussels several changes were made in the regulations governing aviation records.

Height records are to be termed in future altitude records, and the altitude is to be counted from sea level without reference to the altitude of the starting point. In future new records must improve on the previous figure by at least 100 metres instead of the minimum of 150 metres as previously.

Maximum speed records in future must be made over a course of one kilometre, to be flown in opposite directions and at a minimum height of 50 metres. It was decided to do away with hour records and passenger records, the place of the latter being taken by records of useful load transported. A new class of records—machines without motors—is to be recognised.

The question of women's records was raised, but it was decided not to officially recognise them unless they are an advance on masculine performances.

#### Aviation in French Colonies

FOR the purpose of meeting the expenses of military aviation, and also the exceptional expenses of civil aviation in French Colonies, the Chamber of Deputies and the Senate have sanctioned a credit of 3,100,000 frs., which has been placed at the disposal of the Minister of the Colonies. The colonies are to establish a military aviation service, and they will have to contribute to the cost at a rate to be decided each year.

#### Bombing Indian Tribesmen

A DELAYED message from Simla dated October 17, states that our aeroplanes caught 200 tribesmen in the open in Tochi and effectively bombed and machine-gunned them.

#### Aerial Services in Australia

WORD comes from Melbourne, under date October 22, that a scheme is being organised with a view to starting aerial passenger services linking up important places in the different States, in July of next year.

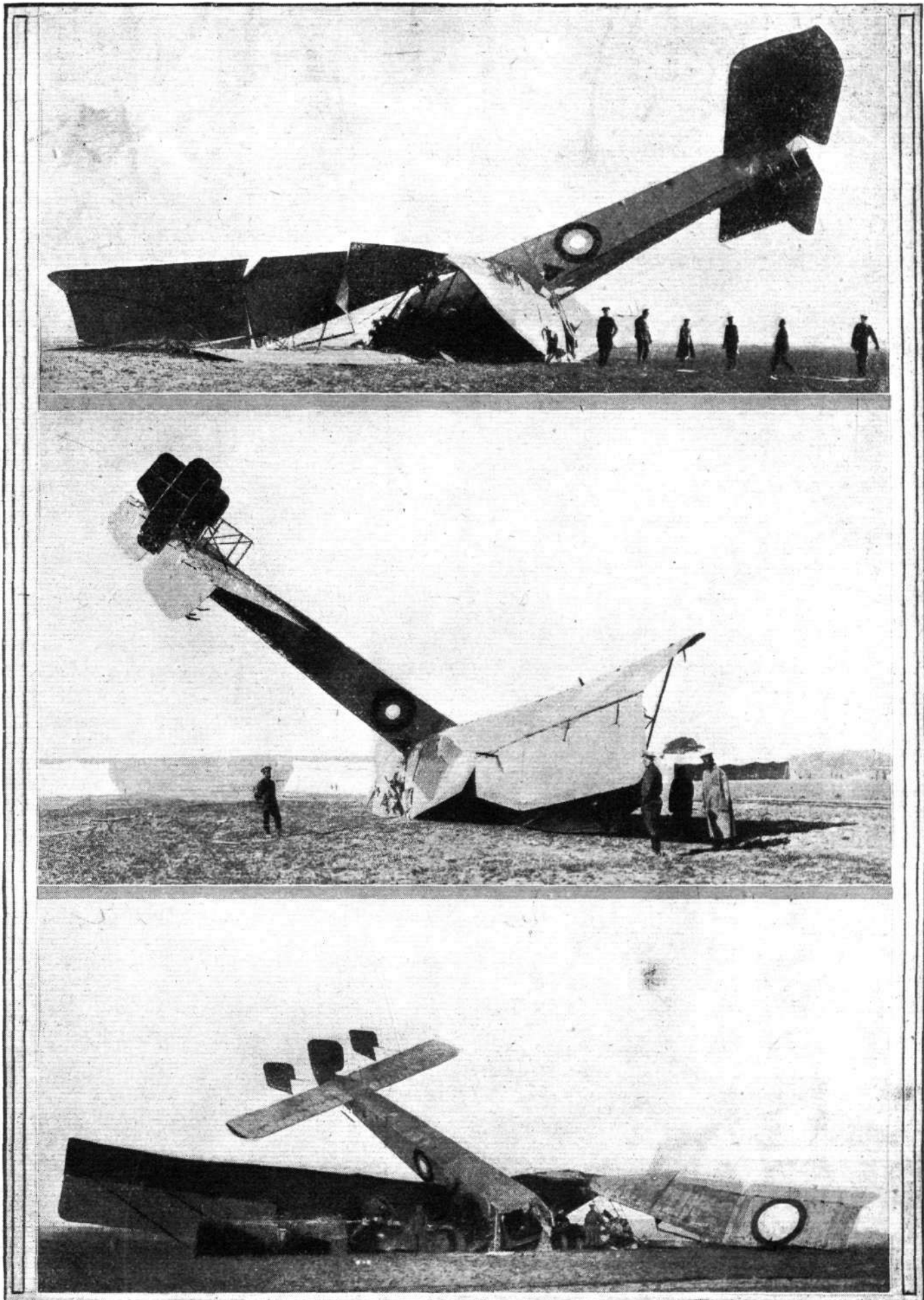
#### A Trans-American Air Mail

FROM a communication sent by the United States Post Office authorities to the American Flying Club, it appears that it is intended to establish a trans-continental air mail route. A Bill has been introduced in Congress giving power to appropriate money for this purpose. It is added that the determination to establish an air mail between New York and San Francisco was arrived at as a consequence of the results of the recent Army transcontinental air race.

#### The U.S. Transcontinental Race

IT appears that, after all, Lieut. Maynard was not the winner of the race across the United States. A message from Washington on October 22 stated that Capt. Donaldson made the 5,700 miles trip from New York to San Francisco and back in 57 hours 33 mins. 57 secs. flying time, as against Lieut. Maynard's 67 hours 3 mins. 40 secs. A later message says that the lowest actual flying time was that of Lieut. Pearson from San Francisco to New York and back in 48 hours 37 mins. 16 secs.





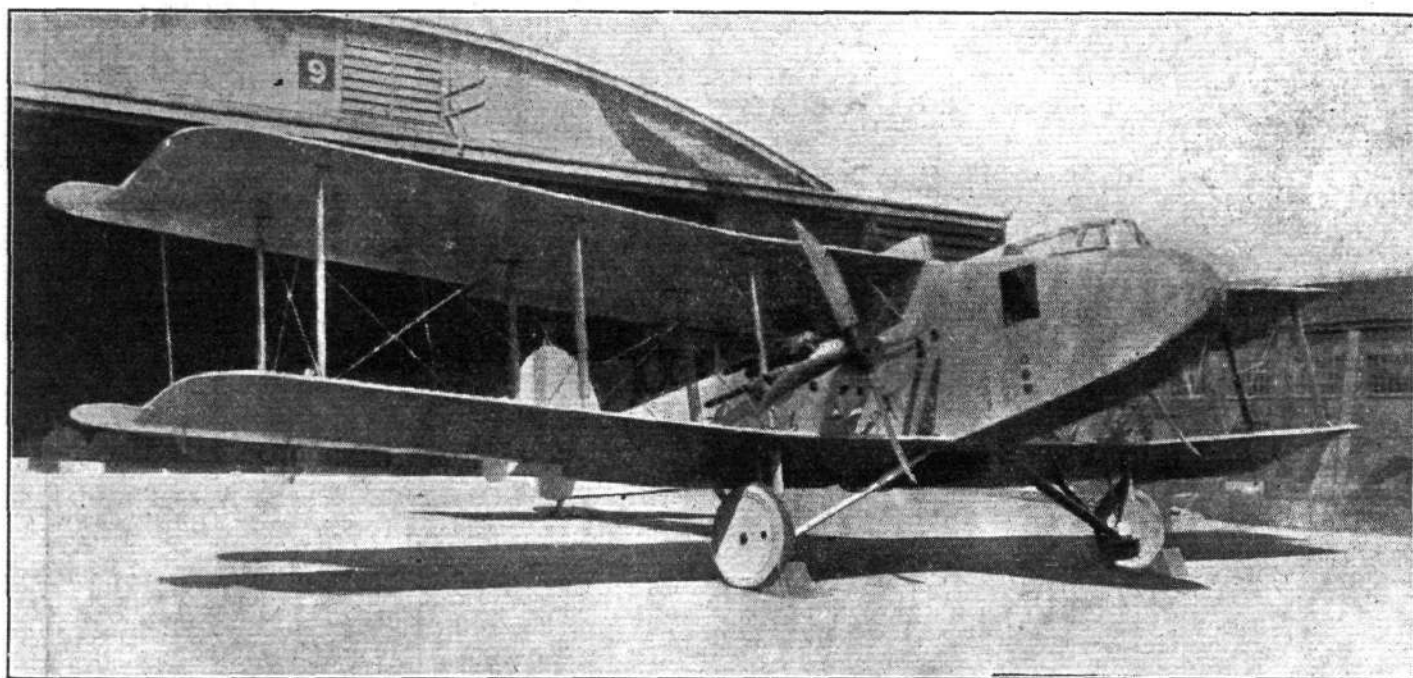
Three views of one of the early Sikorsky biplanes, fitted with two 250 h.p. Salmson engines, which side-slipped from about 20 metres during the retreat from Warsaw

# THE BOULTON & PAUL COMMERCIAL MACHINE :

Two 450 h.p. Napier Lion Engines

GENERALLY speaking, the Boulton & Paul Commercial biplane may be said to be similar to the machine built by this firm for the Transatlantic flight. The deep *fuselage* extends right up to the top plane, thus giving ample accommodation inside for passengers or/and goods. Since, however, the main fuel tanks

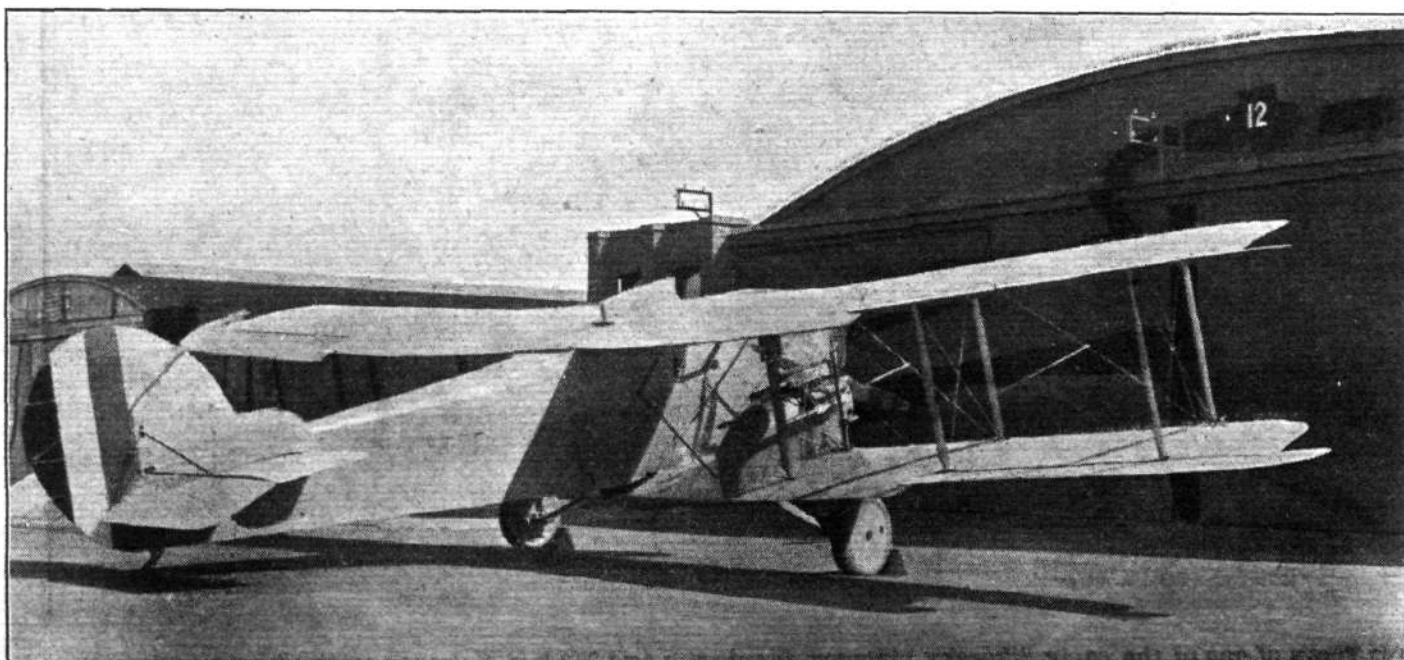
upon whether the machine is to be used for passenger flying, for carrying mails, or for a combination of the two. It will, therefore, be understood that this part of the design is still left open, so to speak, and is subject to alterations as requirements demand. Obviously there is a wide choice according to the use



THE BOULTON & PAUL P.8 COMMERCIAL MACHINE : Three-quarter front view

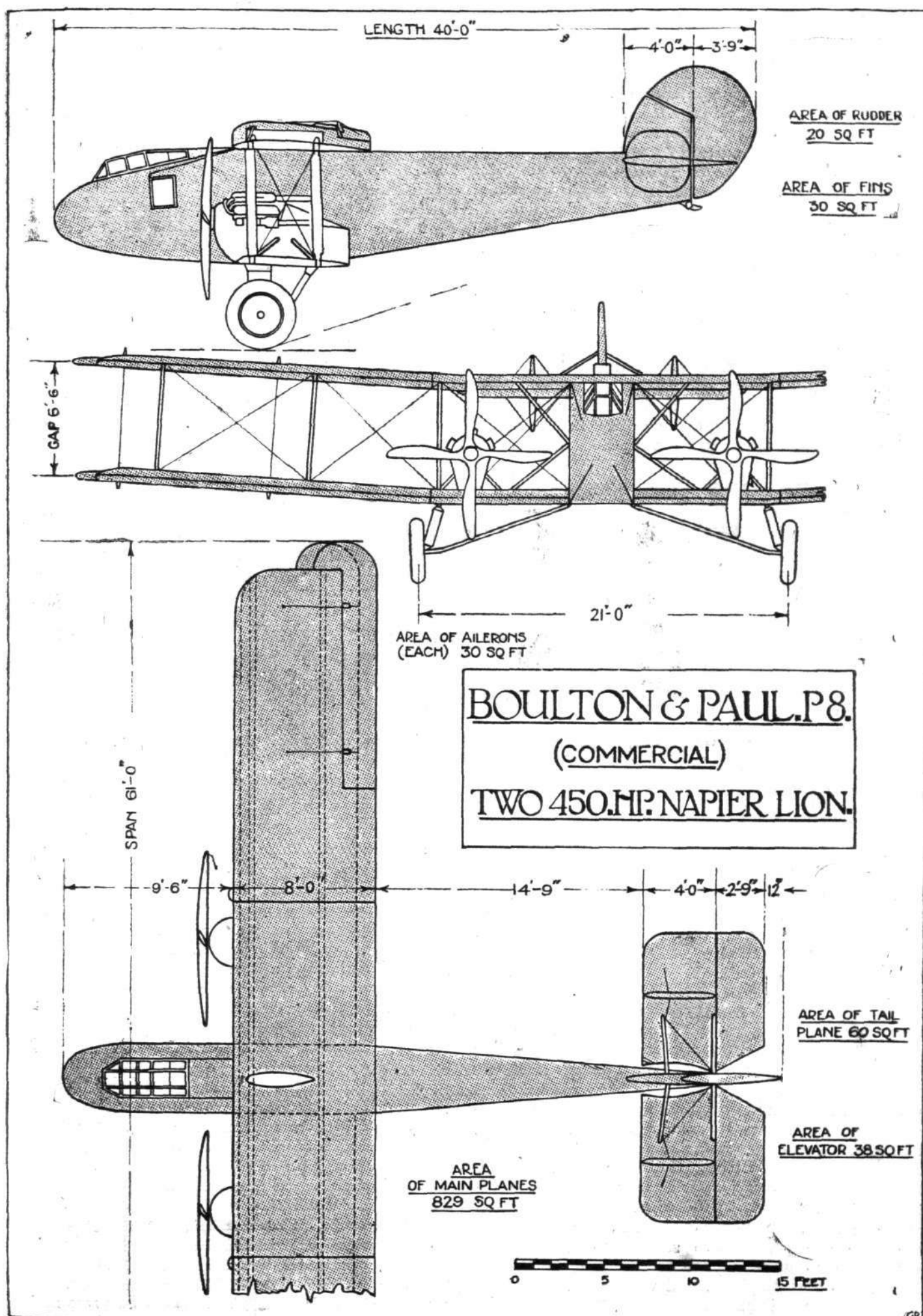
are mounted inside the body, the cargo or passenger space is divided into two separate compartments, one in front of the tanks and one aft of them. As at present fitted up, the machine is not provided with its full complement of seats, etc., as it is intended to obtain a certain amount of experience with her in the air before finally deciding upon the arrangement of seats. Also the arrangement will be largely dependent

to which the machine will be put. For instance, by fitting relatively small tanks and installing a large number of seats, the P.8, as this machine is called on the B. & P. series list, will be able to carry a large load for a relatively short distance. On the other hand, the tank capacity may be increased and mails substituted for some of the passengers. Or, again, all passengers and mails may be left out, the whole



THE BOULTON & PAUL P.8 COMMERCIAL MACHINE : Three-quarter rear view





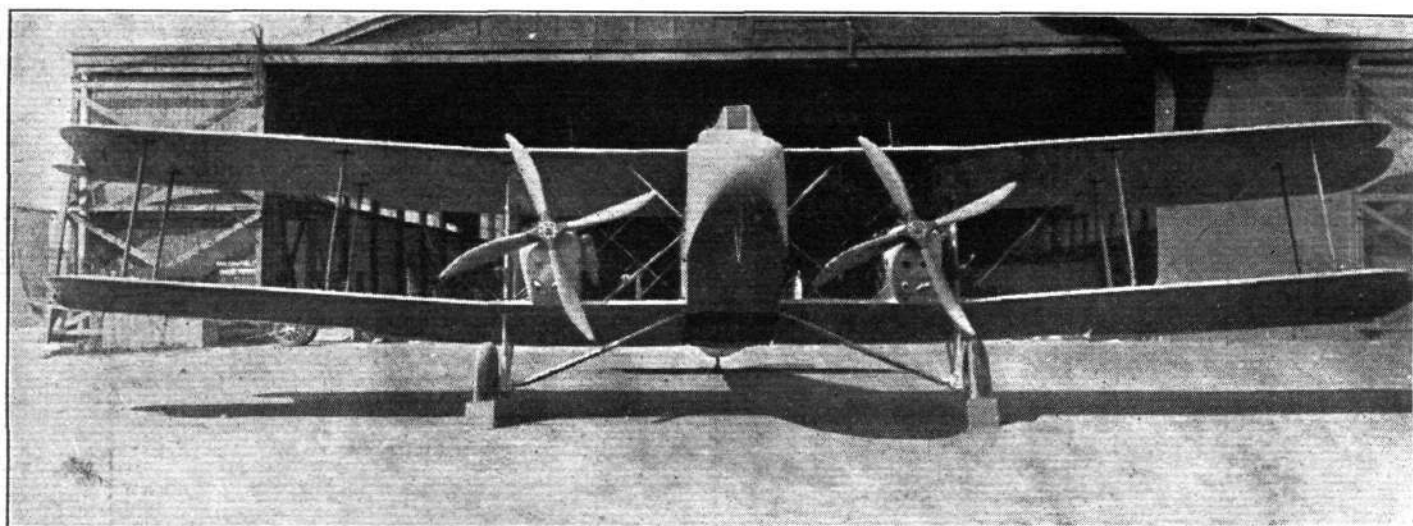
THE B. & P. P.8: Plan, side and front elevation to scale.

carrying capacity being taken up by fuel, in which case the machine would have a very long radius of action.

Constructionally, there are no great innovations to be found in the P8, most of the constructional details being of more or less standard type. It might be pointed out, however, that very extensive use has been made of tubular rivets in place of threaded bolts. This method of securing parts has been found very economical, both as regards strength for weight and in the actual use, the tubular rivets being quick to make once the proper tools for their manufacture have been installed, while replacements take little, if any, longer than would the replacement of a bolt. These tubular rivets are employed for securing the metal fittings to the *fuselage longerons*, and in many other places in the body and undercarriage. They make a very neat job, as there are no boltheads or nuts projecting, but only a thin bell mouth where the ends are flanged out. Apart from the use of these rivets, the *fuselage* is of standard construction, with *longerons* and struts of wood, the structure being cross-braced with standard tie rods. In the front part this simple arrangement is varied occasionally as

this function. If more tanks are fitted for long duration work, some of them near the floor of the body, it will probably become necessary to provide means for transferring the fuel from these into the top tank, but at present the petrol system is simplicity itself, with gravity feed direct from the main tank.

In the fore part of the body, in front of the fore cabin, is the pilot's cockpit, the wind screen for which is so arranged that if desired the pilot can have his head projecting into the open without being in a direct draught, while if desired, he can close a small skylight and be totally enclosed, as are the passengers. From this position he retains quite a good view in practically all directions except straight back, and as the machine is very fast—about 150 m.p.h.—he need not worry overmuch about machines overtaking him. Lateral control is by means of a wheel, and a fore and aft movement of the wheel operates the elevator. Rudder control is normally by foot bar, but by a very ingenious arrangement it is possible during a long flight to lock the *ailerons* and elevator in position and steer the machine by the wheel. One of our sketches shows the control column and wheel. The change-over from foot bar to wheel steering is done with one



THE B. & P. P8 : Front view.

local requirements demand, but, fundamentally, the *fuselage* structure is of the simple girder type. One feature of the *fuselage* design should be pointed out. The upper *longerons* do not run along the top corners of the body, but are placed some distance down the side. As a matter of fact, the top *longerons* run straight, in side elevation, thus forming a good datum line for rigging and trueing-up purposes. From this it will be seen that only the lower part of the *fuselage* is braced, the upper portion being merely a fairing made up of formers and longitudinal stringers. This can be clearly seen in one of the accompanying photographs, which shows the rear portion of the body, looking aft from the rear cabin.

As already pointed out, the main fuel tanks are mounted in the body, and as they are placed over the centre of pressure of the wings, so as not to alter the trim when the fuel is consumed, they divide the available space into two separate compartments. When fitted out as a passenger carrier, both front and rear cabins may be fitted with seats. Owing to the deep body and the possibility of placing the petrol tank high in the body, there is no need for any gravity tank, the main upper petrol tank performing

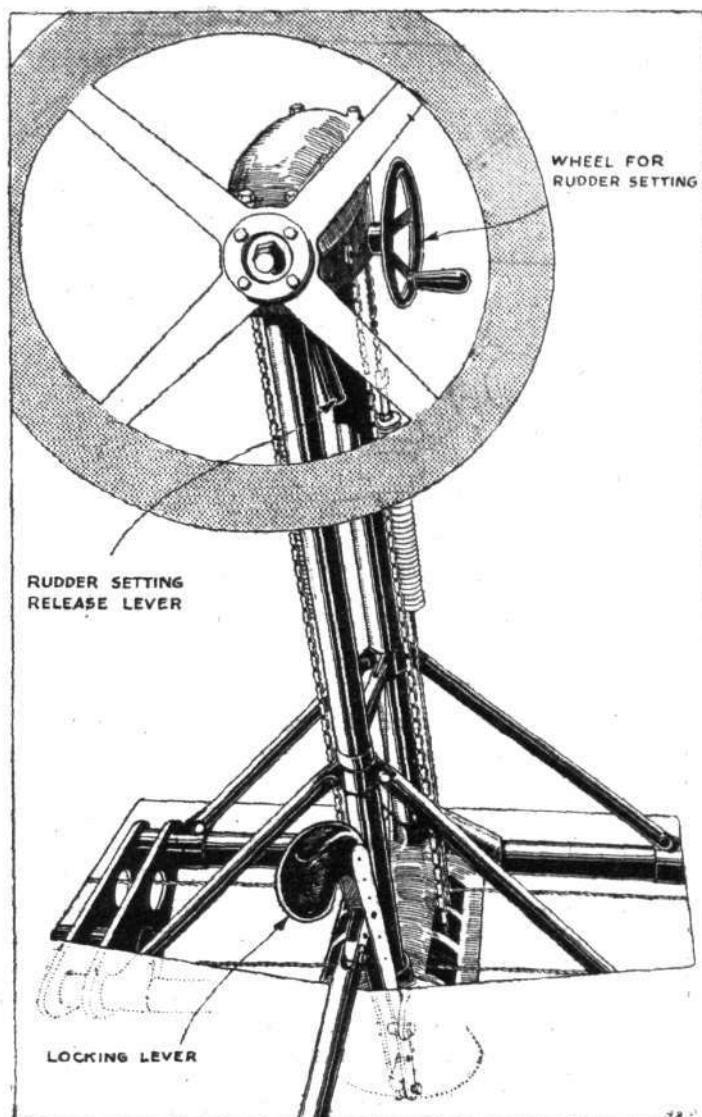
movement. The wheel is so held that the *ailerons* and elevators are neutral and, with the wheel and column in this position, the locking lever shown near the bottom of the sketch is pulled. This locks the lateral and longitudinal control surfaces while at the same time disengaging the foot bar and connecting the rudder cables to the wheel. As the machine is expected to be very stable, this should be a considerable advantage on a very long journey. The controls are instantly returned to the normal by pulling the locking lever in the opposite direction, an operation requiring a fraction of a second only. For use when one engine is pulling slightly more than the other, there is an arrangement, also shown in the sketch, for taking the load thus imposed off the pilot's feet. This consists of a small wheel mounted on the right-hand side of the control column, near the top. Pressing the wheel inwards causes it to engage with the rudder control cables, and turning the wheel then puts one rudder cable under tension, the amount depending upon the number of turns given to the wheel. In this manner the pilot does not have to be pressing constantly with his right or left foot, according to which engine pulls the harder, and the springs incorporated



with the control cables ensure that for steering the rudder is as easy to move as if it were central. In case of total failure of one engine, the turning effort made possible by this arrangement would be insufficient, and provision has been made for this contingency by pivoted fins above and below the tail plane, operated by a wheel on the starboard wall of the pilot's cockpit. The usual tail plane trimming gear is provided, also actuated by a hand-operated wheel.

One of the accompanying sketches shows the engine controls. These consist of two sets of duplicate levers. The rear set is for ordinary engine control, the right-hand lever being the throttle for the starboard engine, the left-hand one for the port engine. The front pair is for altitude control. From the way the levers are mounted, it will be seen that both engines may be throttled together or separately, by moving the two levers together or singly.

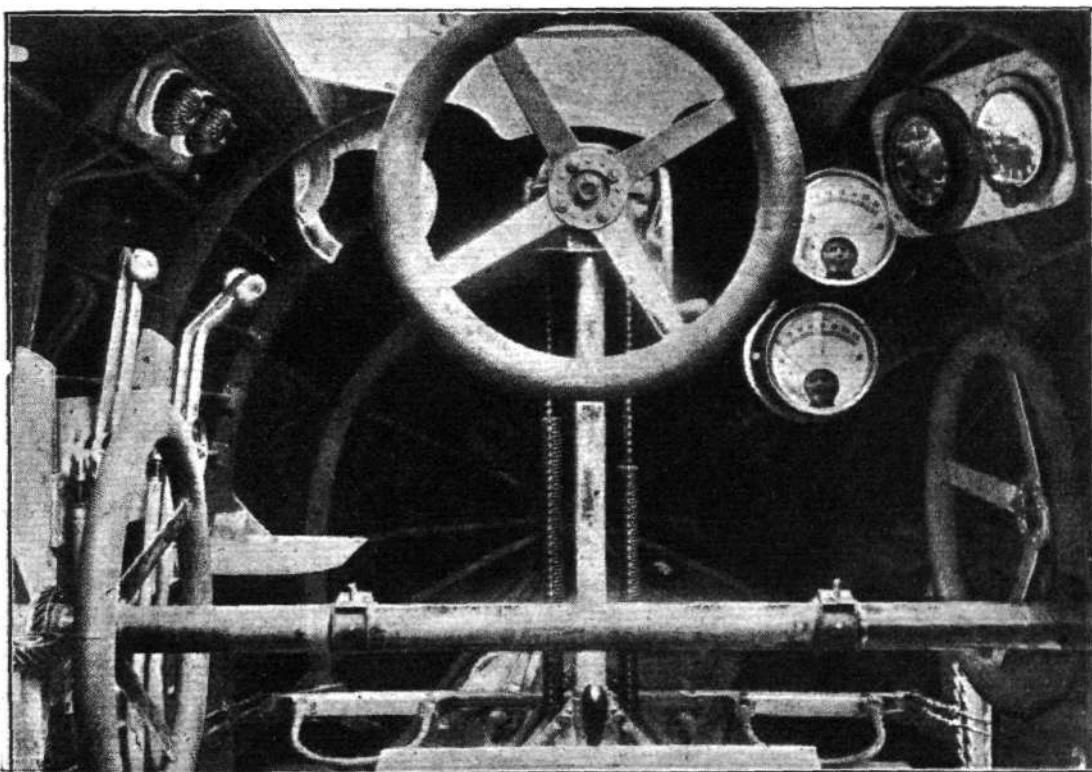
As will be seen from the general arrangement drawings and photographs of the machine, the engines are enclosed in neat aluminium casings, giving a very low resistance. This has been made possible by fitting the radiator in the fuselage. To vary the cooling the radiator is mounted on two vertical worms which can be rotated from the pilot's seat by means of a wheel *via* chains and cables. A header tank is placed in the top plane, connected to the radiator by means of a flexible rubber pipe. This pipe is arranged in a series of zig-zags so as to allow of the raising and lowering of the radiator without getting kinks in the tube. Although the single radiator is not partitioned off, the water system of either engine can be cut off during flight. The manner in which this is accomplished will be understood from reference to the diagram of the water system. The water pumps on the engines draw the water from the bottom of the radiator, force it through the water jackets and hence up to a small tank in the top plane. From this it runs down a pipe to the side of the radiator. Here the water is not allowed to mix at once with that already in the radiator, but has to flow over the top of a small partition near the side of the radiator. The pipes

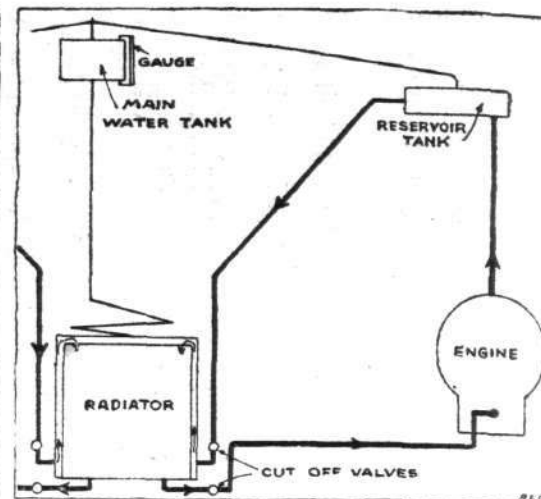
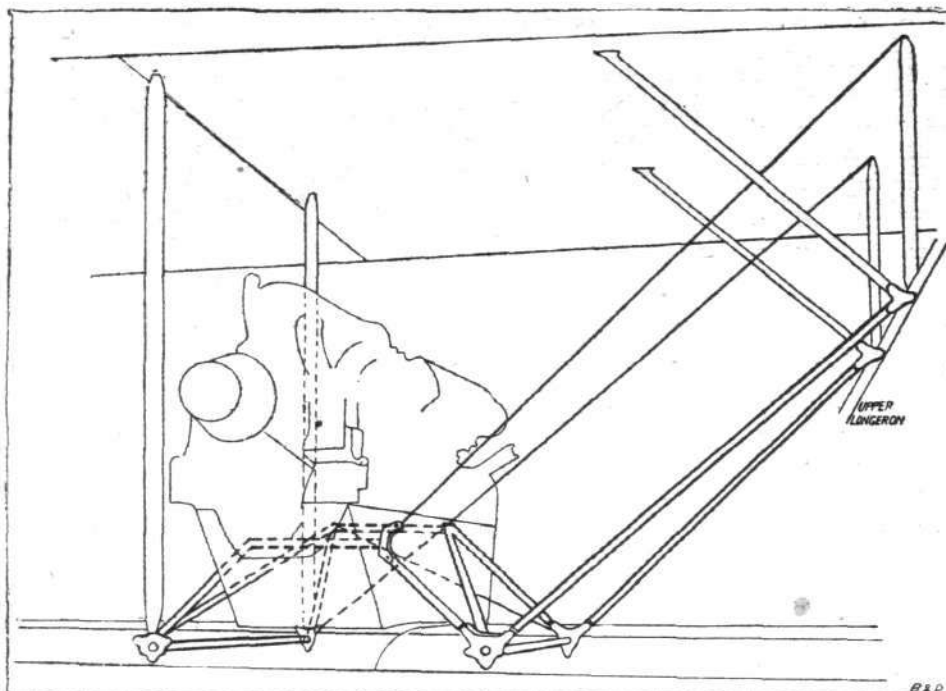


THE B. & P. P.8: Sketch of the controls.

leading from the radiator to the engine, and the return pipes from engines to radiator, are provided with cut-off valves, placed under the bottom of the

The B. & P. P.8: View of the controls. The levers on the left are engine controls, while the large wheel just in front of them is for raising and lowering the radiator. The central wheel is the control wheel, which, by a very ingenious device, can be turned into an ordinary steering wheel, the aileron and elevator controls then being locked in position. The wheel on the right is for trimming the tail plane.





The B. & P. P.8: Above, diagram of the water system. On left, diagram of engine mounting structure, which is so designed that there are no offset moments.

*fuselage* and connected to controls in the pilot's cockpit. The actual cut-off valves are shown in one of the accompanying photographs.

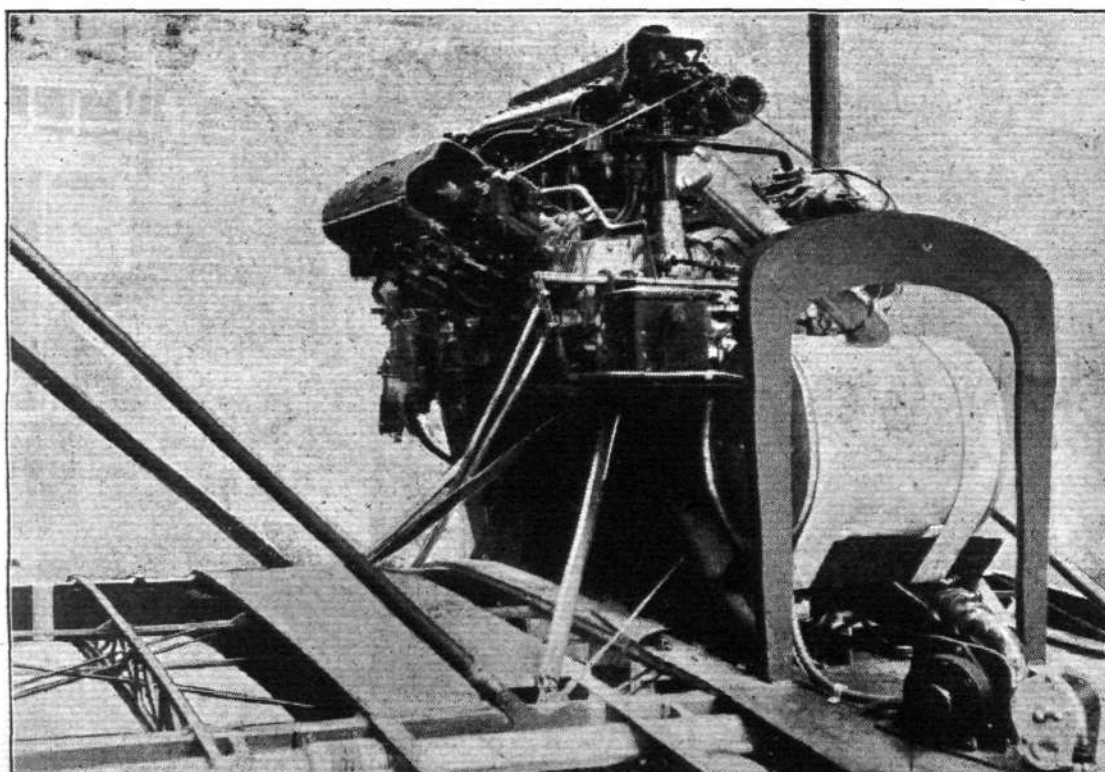
The main planes, of which the top one has a chord of 8 ft., while the bottom plane chord is 6 ft. 6 ins., are of standard construction. The spar fittings are very substantial, as may be gathered from two of our sketches, which show the front and rear fittings at the points where occur the attachments of front and rear chassis struts, inter-plane struts, diagonal engine bed struts, etc. All the struts, it will be seen, are pin jointed. Balanced *ailerons* are fitted to both top and bottom planes.

The 450 h.p. Napier Lion engines are mounted on the bottom planes, the engine beds being of light although very strong design. The vertical supports of the engine bearers are in the form of a framework of wood, covered with three-ply. From the engine bearers diagonal tubes run outwards and downwards,

providing a perfect system of triangulation, which is extended inwards by tubes running from the bottom plane spars to the upper *longerons* of the *fuselage*. The whole engine mounting has been very well thought out, care being taken to ensure that there are no offset moments. The consequence is that there is a marked absence of vibration under all conditions.

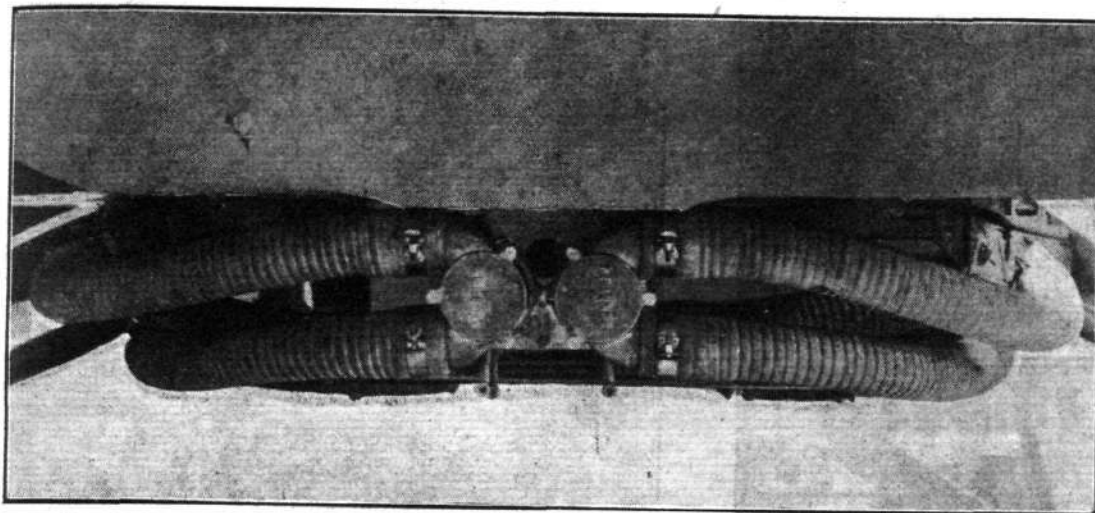
One of our photographs shows the starboard engine in three-quarter rear view. It will be seen that the oil tank is mounted behind the engine. Mounted on the trailing portion of the bottom plane, behind the oil tank, is a hand-operated starting magneto for starting the engine when the machine is on the ground. The engine housing is in the form of sheet aluminium, and may be seen in the photographs of the complete machine.

The undercarriage is in the form of two simple "Vees" of wood, hinged laterally to the bottom



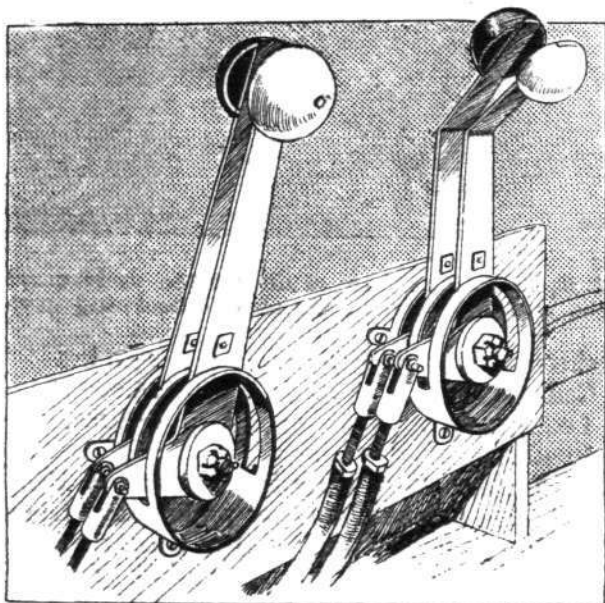
The B. & P. P.8: View from behind of the starboard engine and its mounting.





The B. & P. P.8:  
View of the cut-off valves, mounted underneath the bottom of the fuselage, by means of which the water system of either engine can be cut off.

wing spars. The two axles are of the bent type, hinged at their inner ends to the bottom *longerons* of the fuselage, and carrying at their outer ends the Palmer Cord wheels. Springing is partly by shock

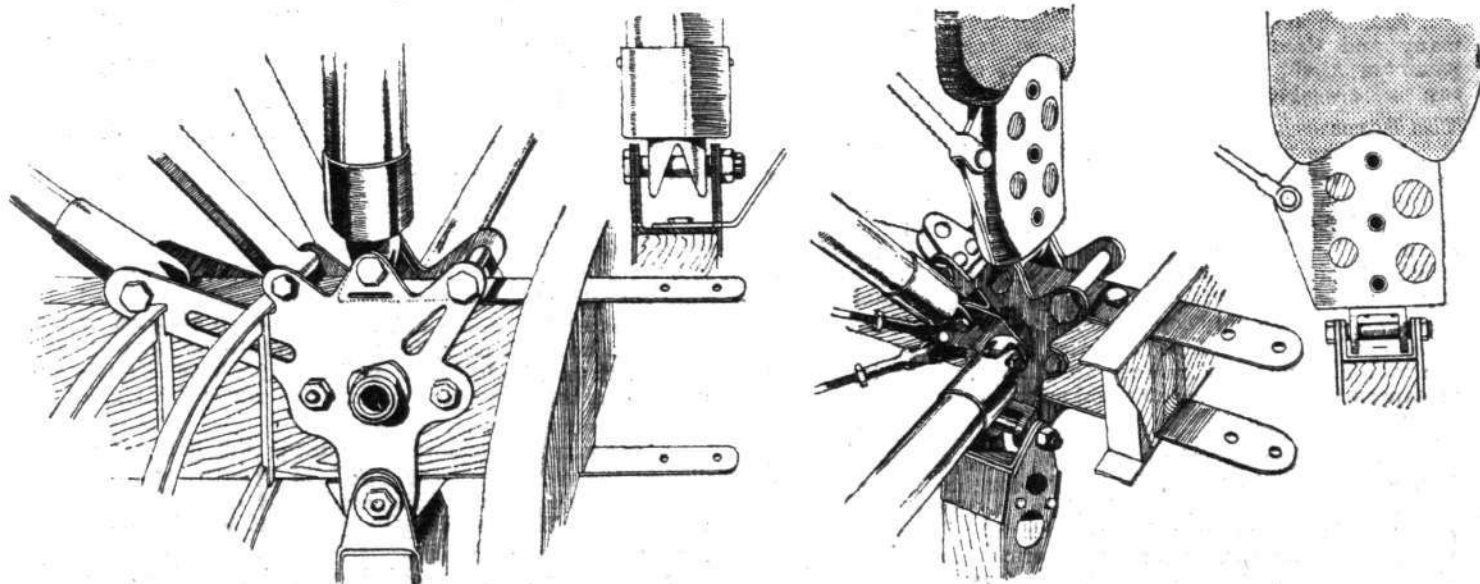


THE B. & P. P.8: Sketch of the engine controls. One set of these is for normal control, the other for altitude control.

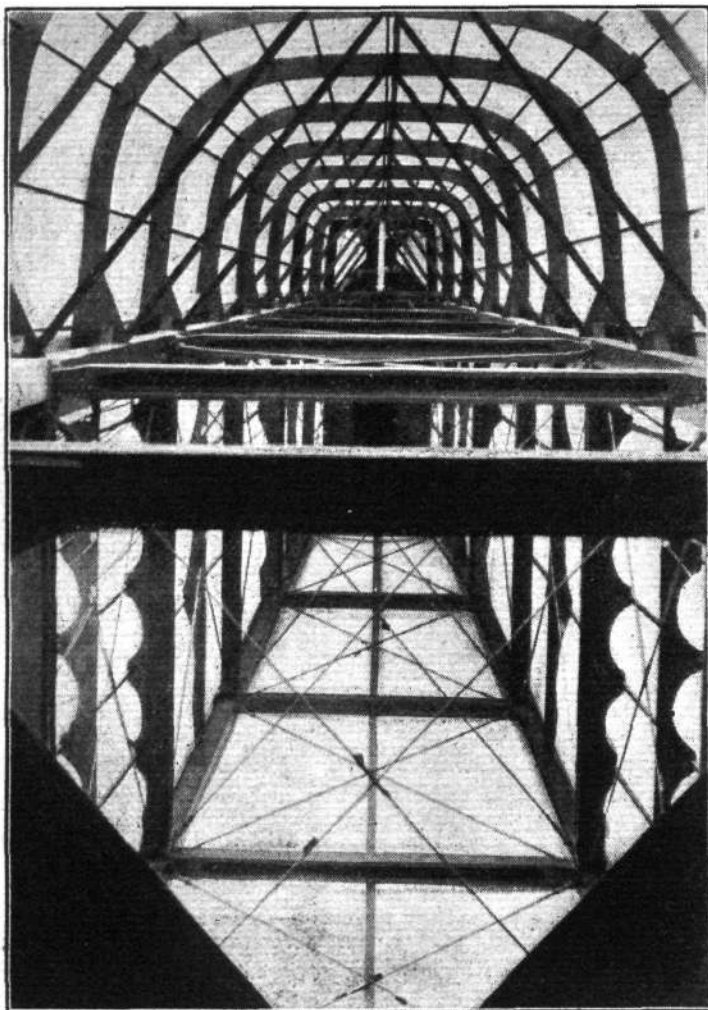
absorbers of rubber and partly pneumatic, the cylinder being shown in one of the photographs.

The control surfaces are of standard type, the rudder being balanced. The tail plane, as already mentioned, is of the variable incidence type for purposes of trimming the machine, and the only respect in which the tail differs from usual practice is in the fitting of two pivoted fins, above and below the tail plane, which serve to balance the turning moment set up when one engine is out of commission.

The aerodynamical features of the P.8 have been thoroughly tested in the wind tunnel of Messrs. Boulton & Paul's experimental department, especial care being taken to ensure good stability, as this is a very important point in a commercial machine designed for long-distance flights. Special apparatus have been designed to facilitate the determination of rotary derivatives, and a great amount of stability work is being done by the B. & P. wind tunnel staff. When, therefore, this firm places a machine on the market it may be taken for granted that every effort has been made to ensure that she is absolutely "right," having that degree of stability which relieves the pilot of the greater part of his work on a long flight, without having the excessive stability that may cause a machine to "take charge" at a time when manœuvrability is required.



THE B. & P. P.8: Combined spar and chassis fittings. On left, fitting on the front spar, and, on the right, the fitting on the rear spar.



THE B. & P. P.8: View inside the fuselage, looking aft.

The main particulars of performance, etc., are as follows:—

Weight, empty	...	4,000 lbs.
" loaded	...	7,000 "
Speed at 10,000 ft.	...	149 m.p.h.
" 15,000 ft.	...	142 "
Climb to 10,000 ft.	...	8 mins.

#### Germany and Czecho Slovakia Air Services

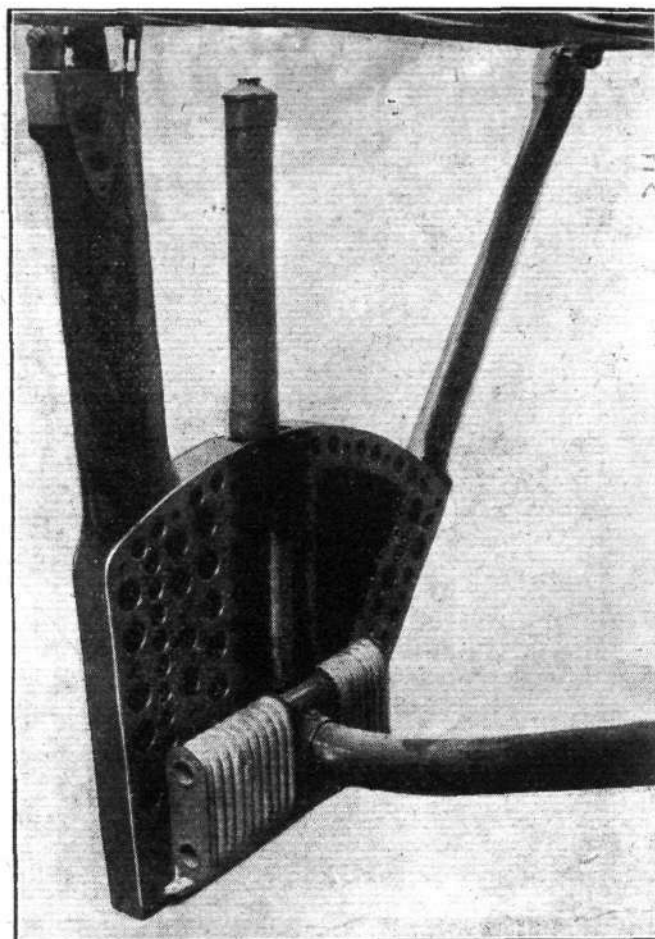
ALL the aerial post and passenger traffic between Germany and Czecho-Slovakia has been taken over by the Saxonian Airship Co., of Dresden. The airship service will run thrice weekly.

#### The Barcelona Race

THE race which was to have been held at Barcelona on October 5 actually took place on the 12th. There were seven entries, including an Ansaldo (250 h.p. Spa); an Espagna (180 h.p. Hispano); an Alfaro (180 h.p. Hispano); a Vendome (60 h.p. Rhone); a Caudron type (80 h.p. Rhone); and two Morane-Saulnier parasols (80 h.p. Rhones). The two last mentioned were piloted by Fronval and Bourgeois respectively, and they were the only competitors to finish the course of 100 kiloms., which they did in the order stated. Two days later the two Frenchmen flew over to Madrid, where they were presented to the military aviation authorities.

#### The Coupe Deutsch

ON October 22 Lieut. de Romanet, on his Nieuport (300 h.p. Hispano-Suiza), in a trial for the Deutsch Cup, completed the circuit round Paris at an average speed of 268.631 kiloms. per hour, but as this did not improve upon Sadi Lecointe's performance by 10 per cent., it did not entitle him to the Cup. The next day, therefore, he made another attempt, and succeeded in averaging 285.600 kiloms. per hour (177 miles per hour), which, when it is officially accepted by the Aero Club of France, will give him first place in the competition.



THE B. & P. P.8: View of one of the undercarriage Vees with rubber and air shock-absorbing device.

Climb to 15,000 ft.	...	15 mins.
Ceiling	...	25,000 ft.
Load/sq. ft.	...	8.4 lbs.
Load/h.p.	...	7.7 "

At the time of writing the Boulton & Paul P.8 has just been finished, and her preliminary trials are due to take place any time. After them the machine will probably be heard of shortly, but of the exact nature of the flight we are not permitted to speak at present.

#### A Swiss Height Record

ON October 24 the military pilot Progin, at Thoune, on a D.H. 5 (200 h.p. Winterthur), beat the Swiss height record, attaining an altitude of 8,200 metres. He then had trouble with his oxygen apparatus, lost consciousness and momentarily lost control of the machine, which fell to 7,000 metres. He then revived and brought the machine down safely after being in the air for two hours.

#### The Gordon Bennett Balloon Race

THE F.A.I. has decided that the next Gordon Bennett race for free balloons shall be held in the United States in 1920.

#### After the New York-Toronto Race

THE attention of the F.A.I. having been directed to the recent race between New York and Toronto, which was won by Lieut. Maynard, all the competitors have been disqualified, as it appears that the event was not run under F.A.I. rules.

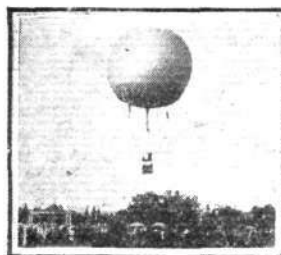
#### Italy Honours Belgian Pilots

A PLEASANT little interlude during the banquet which followed the meeting of the F.A.I. in Brussels was the presentation of medals and diplomas by the Aero Club of Italy to the leading Belgian pilots, Coppens and Oliaslagers.

#### A New Looping Record

FROM Madrid comes word that the French pilot, Fronval, presumably on a Morane parasol, has succeeded in looping the loop 624 times in a flight of 2 hours 49 mins. 9 secs., at the Four Winds Aerodrome, thus beating the previous "record" of 455 loops in one flight made by the American flyer, Nail.





# AIRSHIPS



## AIRSHIP ENGINEERING PROGRESS IN THE UNITED STATES\*

By J. C. HUNSAKER, Eng. D., Commander, Construction Corps, U.S. Navy

LIGHTER-THAN-AIR engineering is a very recent development in the United States, and was not really taken up seriously until December of 1916, when the possibility of the United States becoming involved in submarine warfare began to be feared. The Navy Department had always had a mild interest in airships or dirigibles, and placed a contract in 1915 with a firm which had got hold of a German engineer, a German mechanic, and an Austrian airship pilot. This contract called for a training ship of very moderate performance, but it was not delivered until two years later, and was so much over-weight and otherwise so unreliable that after a few short flights it was broken up as useless. This experience was discouraging, as it was hoped from experience with this ship to get some idea of where the Navy ought to use airships.

However, reports began to drift in of the use by the British Navy of small airships for anti-submarine work, coast patrol and dropping depth bombs. In December, 1916, the Department asked the Bureau of Construction and Repair to design an airship for coast patrol and training work. The characteristics were: Speed, 45 m.p.h.; endurance, 12 hours at 35 m.p.h.; radio for 150 miles; crew of three; provision for alighting on the water.

At this time, barring the concern with the German talent, which had built the first rather unfortunate ship, there was no experience in modern airship construction in the country to draw on either for design or for knowledge of the special materials needed.

As the United States still preserved diplomatic relations with Germany, no detailed information from abroad could be secured legitimately.

### Development of B-Class

To meet the problem, a design was started which was later designated Type B. The only engines available having any fair claim to reliability were the 100 b.h.p. Curtiss eight-cylinder and the 100 b.h.p. Hall-Scott four-cylinder types. Calculations based on the speed required from this horsepower available and the load to be carried fixed the envelope volume, which was to be a minimum consistent with the characteristics demanded.

Lacking experience, dependence had to be placed on theoretical and experimental investigations. The literature of the art was assembled from the Library of Congress and the Smithsonian Institution, and a deliberate attempt made to read it all. It looked a very imposing collection, but boiled down there appeared to be little or no practical information. The theory of ballooning was very complete, but it appeared that the theory of airship design had been developed under governmental control in France and Germany, and the greater part had been kept confidential. For details of construction we had the benefit of an inspection of airships made in 1913 in France, England and Germany, and a good deal of information had been collected in spite of the restrictions. However, such information was now four years old.

To determine a form of envelope of low resistance, a series of models was run in the bureau's wind tunnel and the best selected. The sizes of fin and control surfaces were also determined from wind tunnel tests. We had no practical design rules to follow, and it appeared that a speed of 45 m.p.h. for a small airship was so high that difficulties in steering might be anticipated. Accordingly, very careful experimental and theoretical studies were made to make sure. The results on the trials showed that the calculations gave ample stability, and after the pilots had become more experienced it was found possible to cut down the vertical fin surface.

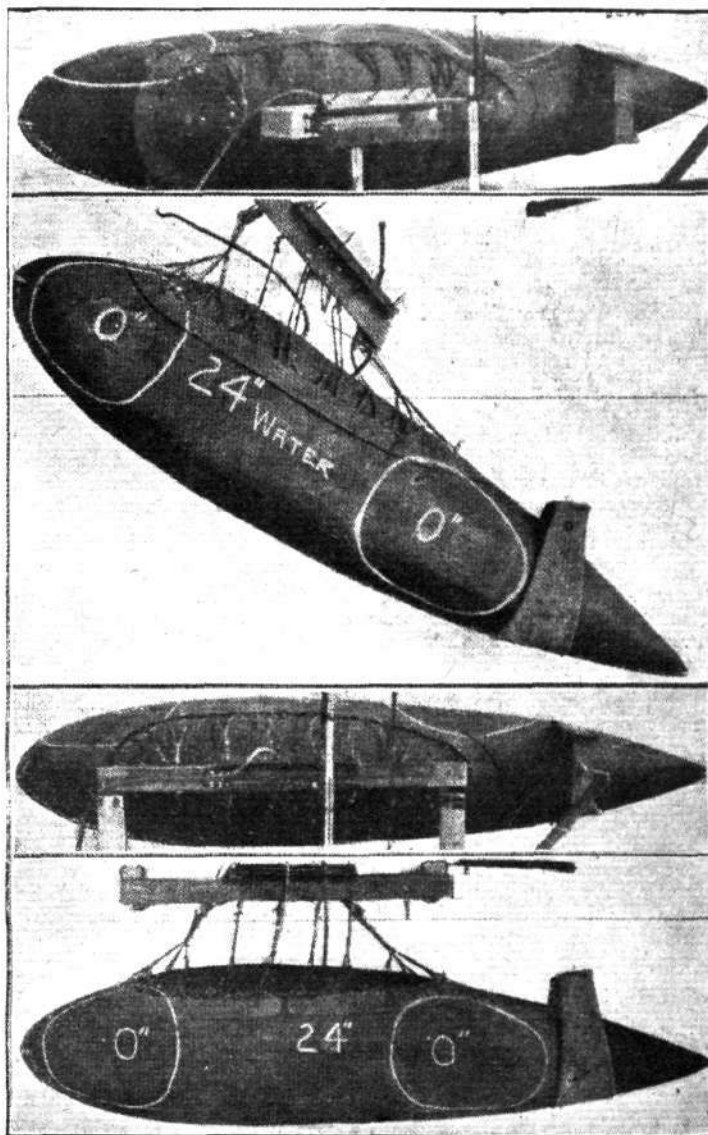
The design of the car presented no difficulties, as we could follow aeroplane practice, using a standard aeroplane power-plant.

To connect the car to the envelope or gas-bag was a different story, however. This is the most delicate part of the design,

and the point where we were most ignorant. The non-rigid airship keeps its form against the pressure of the air because it is held out full and taut by inner gas pressure. It now was necessary to suspend the car containing all the heavy weights from the fabrics of this gas-bag in such a manner as not to deform the bag or put undue local stresses in any part of it. The calculations involved in the design had to be devised from general naval architectural principles but were not very satisfactory on account of the indeterminate nature of the distribution of load between the various suspension cables. It was desired to use the lightest fabric that could be considered safe, but the envelope must remain fair and stiff, with no more than 1 in. of water pressure.

The loads were arranged in what appeared a reasonable manner, and the curves of bending moment and shearing force drawn, considering the envelope as a beam. The calculation made was identical with that used in computing the longitudinal strength of vessels, and need not be described further.

To verify the calculated strength of envelope fabric and the



Four views of a water model of B-class envelope undergoing test inclined at 30° and level trim.

\* From Aviation, U.S.A.

internal pressure necessary to preserve fair form under the influence of the suspension loads and the forces to be expected on fins and rudders, a water model experiment was made. The theory of this test was given by Haas and Dietzius in "Formänderungen der Hülle von Prall Luftschiße." It is there shown that a one-thirtieth scale model of the airship if made of the fabric it is intended to use, and filled with water instead of gas, will, if suspended in an inverted position, behave statically exactly like the full size ship. That is to say, the stresses and deformations of the envelope will be the same. Tests were made at different pressures and at different trims to make sure that when diving or climbing nothing abnormal would happen. The static balance and control were also studied by inflating the ballonets with air under different conditions.

The calculations appeared to be verified nearly enough, and the design was proceeded with. We had no means of knowing what factors of safety to use, in spite of a knowledge of the stresses. However, theory was again resorted to, and the worst possible conditions in service investigated. Based on such study, a factor of 9 under normal conditions appeared reasonable and was adopted. Curiously enough, we learned later that this is the usual French practice.

The characteristics of the design were as follows:—

Length .. .. .	160 ft.
Diameter .. .. .	31.5 ft.
Height .. .. .	50 ft.
Power of main engine .. .. .	100 h.p.
Power of blower engine .. .. .	2 h.p.
Maximum speed .. .. .	45 m.p.h.
Cruising speed .. .. .	35 m.p.h.
Endurance at 45 miles .. .. .	10 hours.
Endurance at 35 miles .. .. .	16 hours.
Petrol capacity .. .. .	100 galls.
Ballonet volume .. .. .	19,250 cub. ft.
Envelope volume .. .. .	77,000 cub. ft.
Gross lift at .068 lb. per cub. ft. .. .. .	5,275 lbs.
Weight empty .. .. .	3,256 lbs.
Instruments, etc. .. .. .	100 lbs.
Blower outfit .. .. .	100 lbs.
Radio outfit .. .. .	250 lbs.
Lighting set .. .. .	15 lbs.
Two men .. .. .	320 lbs.
Fuel and oil .. .. .	633 lbs.
Ballast .. .. .	290 lbs.
Margin .. .. .	311 lbs.
Useful load, 38 per cent. or .. .. .	2,019 lbs.

#### The 1917 Programme

The plans were approved by the Secretary of the Navy, January 27, 1917, but instead of authorising the construction of one or two units as an experiment to work out the design, he ordered 16 airships to be produced as rapidly as possible. This came as a thunderbolt, and it seemed at first impossible of execution. It was impossible to allow six months to build an experimental ship, develop the proper gas-tight fabric needed, correct defects in design and then instruct contractors in the manufacture.

(Note.—This original design was described in FLIGHT for April 12, 1917.—ED.)

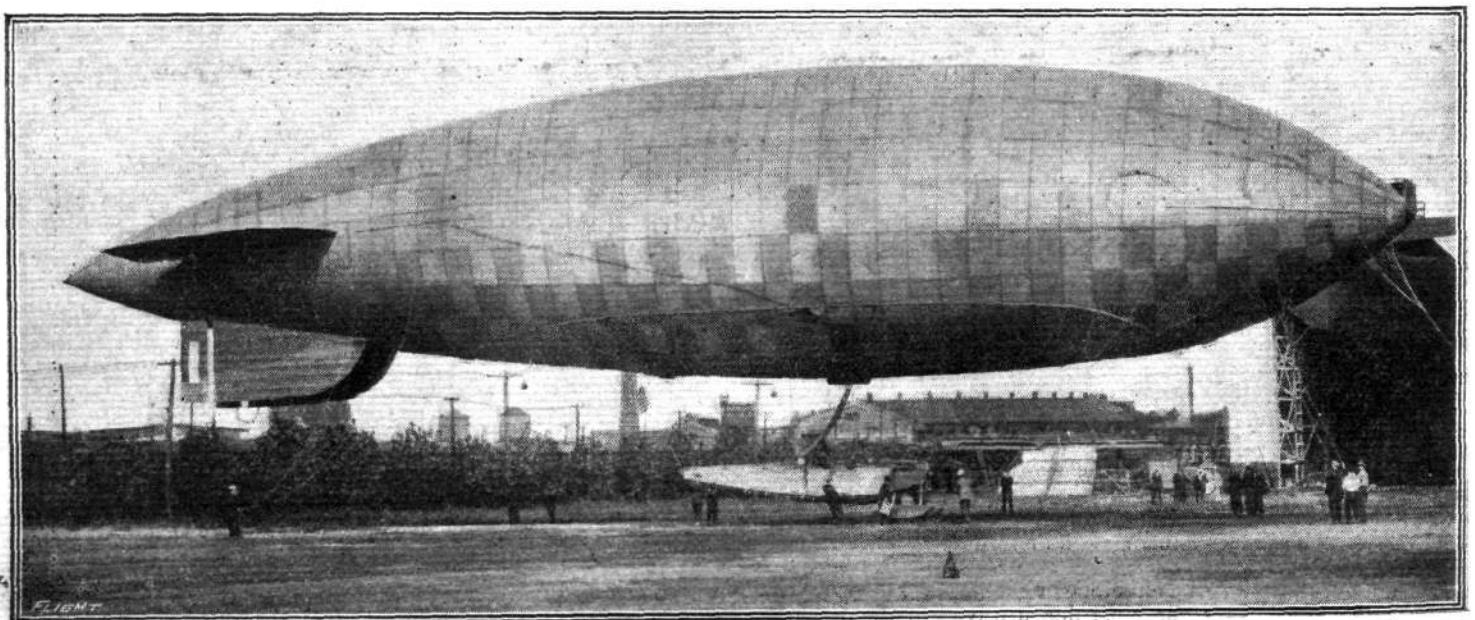
The Chief Constructor, therefore, decided to go ahead with the construction regardless of the unproved nature of the design, and on February 6, 1917, sent copies of the plans and specifications to five firms which had offered their facilities to the Department for War work and which he considered to be in a position to help. Representatives of these five firms met with the Chief Constructor on February 12 to discuss ways and means for getting the 16 ships built quickly.

The five firms requested to undertake the work were the Curtiss Aeroplane and Motor Corporation, the Connecticut Aircraft Co., and the three great rubber manufacturers—Goodyear, Goodrich and U. S. Rubber. The conference resembled a patriotic meeting rather than a gathering of prospective Government contractors; but, in spite of a very great desire to help the Navy, it was immediately apparent that no one of them was in a position to handle the work. In the first place, they were without experience in airship building with the exception of the one unsuccessful attempt of the Connecticut Aircraft Co. None of the rubber companies had ever made fabric of the hydrogen-resisting quality and strength required, and it would be necessary not only to develop new processes, but to put in new machinery and special equipment to manufacture it. Supplies of the special fine cotton cloth needed would have to be obtained, and the market for it was in an abnormal condition.

None of the firms represented had any building large enough to erect an airship, and, though the Navy was planning to put up eight airship sheds at coastal stations, the date of completion of such sheds was probably too remote to render them available for the first few ships turned out. It was of utmost importance that one ship should be rushed to completion in order to prove the design before the others were too far advanced.

It was agreed at the conference that the manufacturers should form a committee, which committee should arrange that each concern would bid for such proportion of the work as appeared to be within its capacity, that the raw materials, information and experience of all would be pooled both before and during manufacture, and that each would bid a flat price with a guarantee and bond. The present form of cost-plus contract or "Navy Order" was then unknown, and the bid price arrived at was purely an estimate based, to a large extent, on information from abroad which the Bureau made available to the committee. The price agreed upon was about \$40,000 per airship, with a guarantee to produce a practical ship making more than 35 m.p.h., and a guarantee to replace any defective parts for three months. As things worked out, most of the contractors lost money, for the work was done as a rush job and no expense was spared.

The Goodyear Co., as the most experienced, having built free balloons for a number of years, was in the best position to go ahead. R. H. Upson and R. A. D. Preston, aeronautical engineers of the Goodyear Co.'s staff, had had several years' experience in designing, making and practical handling of free balloons. They could be relied upon to cope with the present problem. Goodyear agreed to put up at its own expense a complete erection and testing establishment consisting of a field near Akron, Ohio, with a large capacity hydrogen



One of the U.S. Navy B-Class dirigibles, with original double fins



generating plant and an airship shed 200 ft. by 100 ft. by 100 ft., together with the barracks for the necessary field organisation. This decision was reached on March 20, 1917; ground was broken for the hangar and hydrogen plant on April 1, 1917, and the first balloon (a free balloon) was inflated in the hangar on June 1, 1917.

The Goodrich Co., to make up for its lack of experience in making airship envelopes, cabled for M. Julliot, the well-known engineer of the Lebaudy firm in Paris, whom they had been in correspondence with. M. Julliot sailed immediately, and later, when the United States had declared war on Germany, the Department was able to arrange for the release from the French Army of M. Julliot's assistants, M. Bourguignon and M. Gautier. These men, together with Mme. Bourguignon, who was a skilled fabric worker, were of the greatest assistance in introducing the practical refinements in manufacture about which information was so much needed.

The United States Rubber Co. decided not to attempt to build complete airships, but undertook to supply fabric for the Connecticut Aircraft Co.

### First Trials

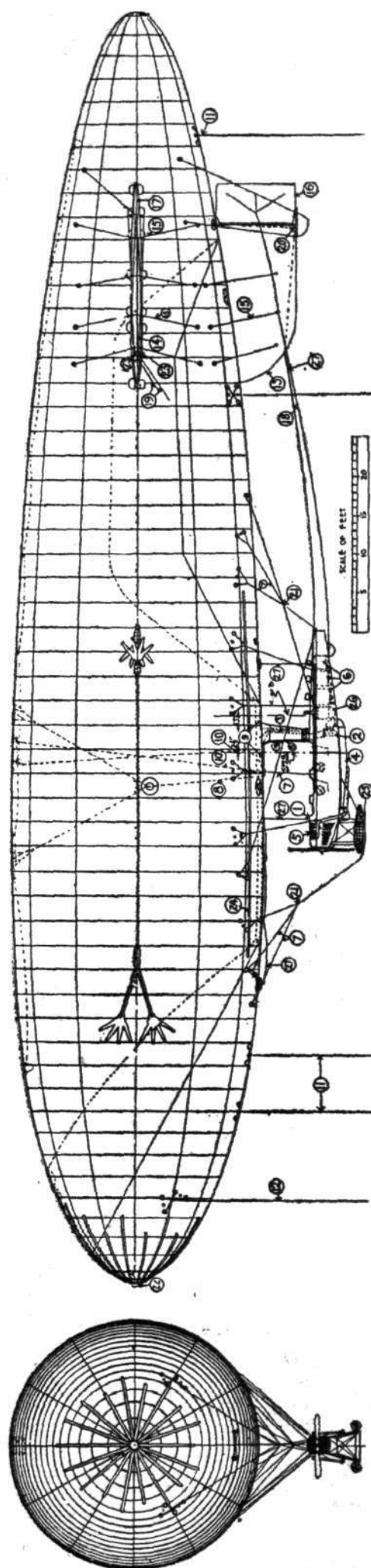
The Goodyear Co. completed the first airship in May, 1917, before their shed at Akron was completed. The Goodrich Co. had in the meantime found an abandoned shed at the "White City," Chicago; put it in order and arranged for a large supply of hydrogen in flasks. In order to get a trial of a type ship for the benefit of all contractors, it was arranged to ship the first Goodyear ship to Chicago. The ship was assembled, inflated, and given a short flight by R. H. Upson, of the Goodyear Co. He was so favourably impressed with the results that on the second time up, the weather being favourable, he considered there was less danger in trying to fly home to Akron than in attempting a return to the little field at Chicago, which was seriously restricted by buildings and telegraph wires. Accordingly, he headed for Akron at midnight, and at noon of the next day, Decoration Day, 1917, landed in a meadow 10 miles from Akron. Had the oil supply held out he could have landed on the Goodyear field, but the motor seized at the last minute.

The flight was remarkable in several particulars. In the first place, it was one of the longest airship flights on record up to that time. In the second place, it was a maiden flight of a new airship designed from theoretical and experimental data by a designer of no experience and built in two months by a firm without previous airship experience. In the third place, the flight is astonishing because Mr. Upson was not then an airship pilot, and by our present standards could not have been expected to handle the ship until he had gone through several weeks' instruction at the hands of an experienced pilot. However, he was an experienced balloonist, and as an engineer had a thorough appreciation of how the airship was designed to function. This flight was very encouraging for the production programme, as it proved that the design was all right and permitted the contractors to go ahead with confidence.

From then on the ships were delivered with regularity, and by the end of the year were operating at the various naval air stations. The following table gives the dates of delivery of these ships:—

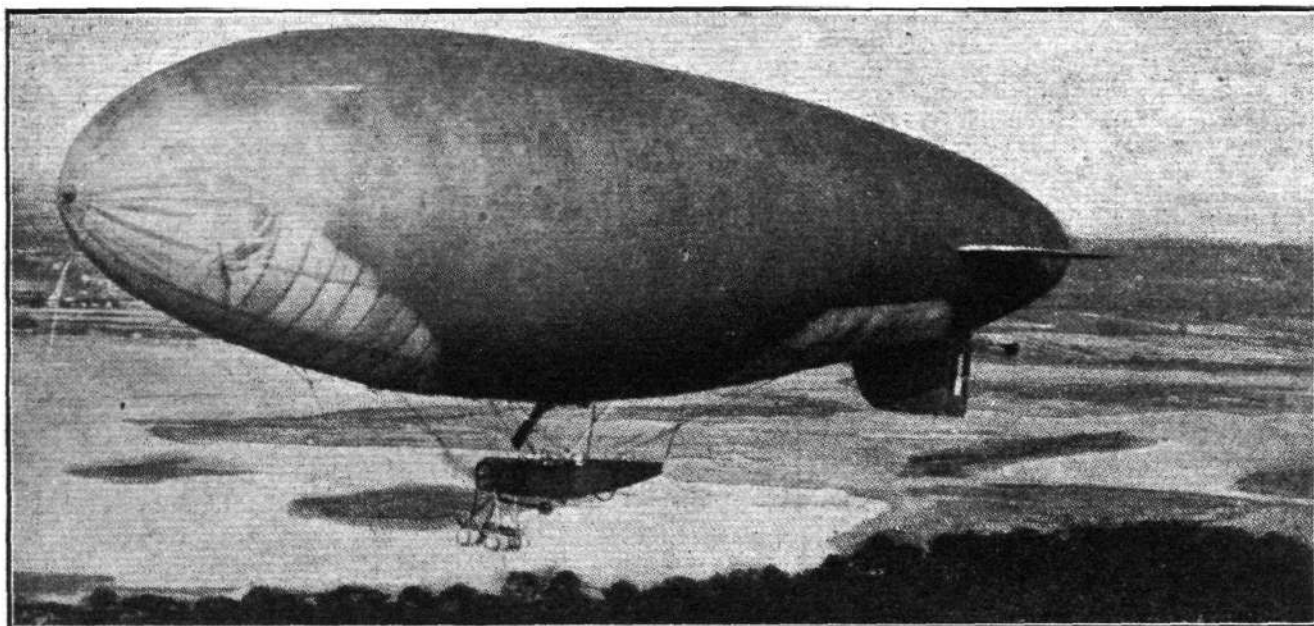
No.	Manufacturer.	Date.
B 1	Goodyear .. ..	July 19, 1917.
B 5	Goodyear .. ..	August 11, 1917.
B 13	Goodrich .. ..	September 11, 1917.
B 3	Goodyear .. ..	October 22, 1917.
B 4	Goodyear .. ..	December 4, 1917.
B 15	Connecticut .. ..	December 14, 1917.
B 14	Goodrich .. ..	January 11, 1918.
B 2	Goodyear .. ..	January 22, 1918.
B 9	Goodyear .. ..	January 31, 1918.
B 8	Goodyear .. ..	February 25, 1918.
B 7	Goodyear .. ..	February 27, 1918.
B 6	Goodyear .. ..	March 3, 1918.
B 10	Goodrich .. ..	April 15, 1918.
B 16	Connecticut .. ..	April 15, 1918.
B 11	Goodrich .. ..	May 8, 1918.
B 12	Goodrich .. ..	June 6, 1918.

As the airships came along improvements and changes based on experience were incorporated. Suggestions for improvements in details of design came first from the contractors, and later, as more Navy pilots became trained, useful suggestions came from the service. The Goodyear Co. proposed many refinements in design, which they introduced as a result of the experience of their test pilots, Mr. Upson and Mr. Preston. The enterprise of that firm in providing a flying field at Akron, near their works, placed them in a position to experiment in the air.



THE U.S. NAVY B-CLASS DIRIGIBLE: Side front and elevations to scale

DESCRIPTION OF PARTS, B-CLASS DIRIGIBLE: (1) Car. (2) Blower. (3) Blower line. (5) Engine. (6) Petrol tanks. (7) Car suspensions. (8) Valve cord. (9) Pressure tubes. (10) Rip cords. (11) Grab ropes. (12) Mooring ropes. (13) Vertical fin. (14) Horizontal fins. (15) Fin suspension. (16) Rudder. (17) Elevators. (18) Rudder control. (19) Elevator control. (20) Pulley for valve cord. (21) Concentration rings. (22) Nose piece. (23) Pulley for control cables. (24) Rim loop. (25) Pontoon. (26) Water ballast tank. (27) Cables Operating Valves.



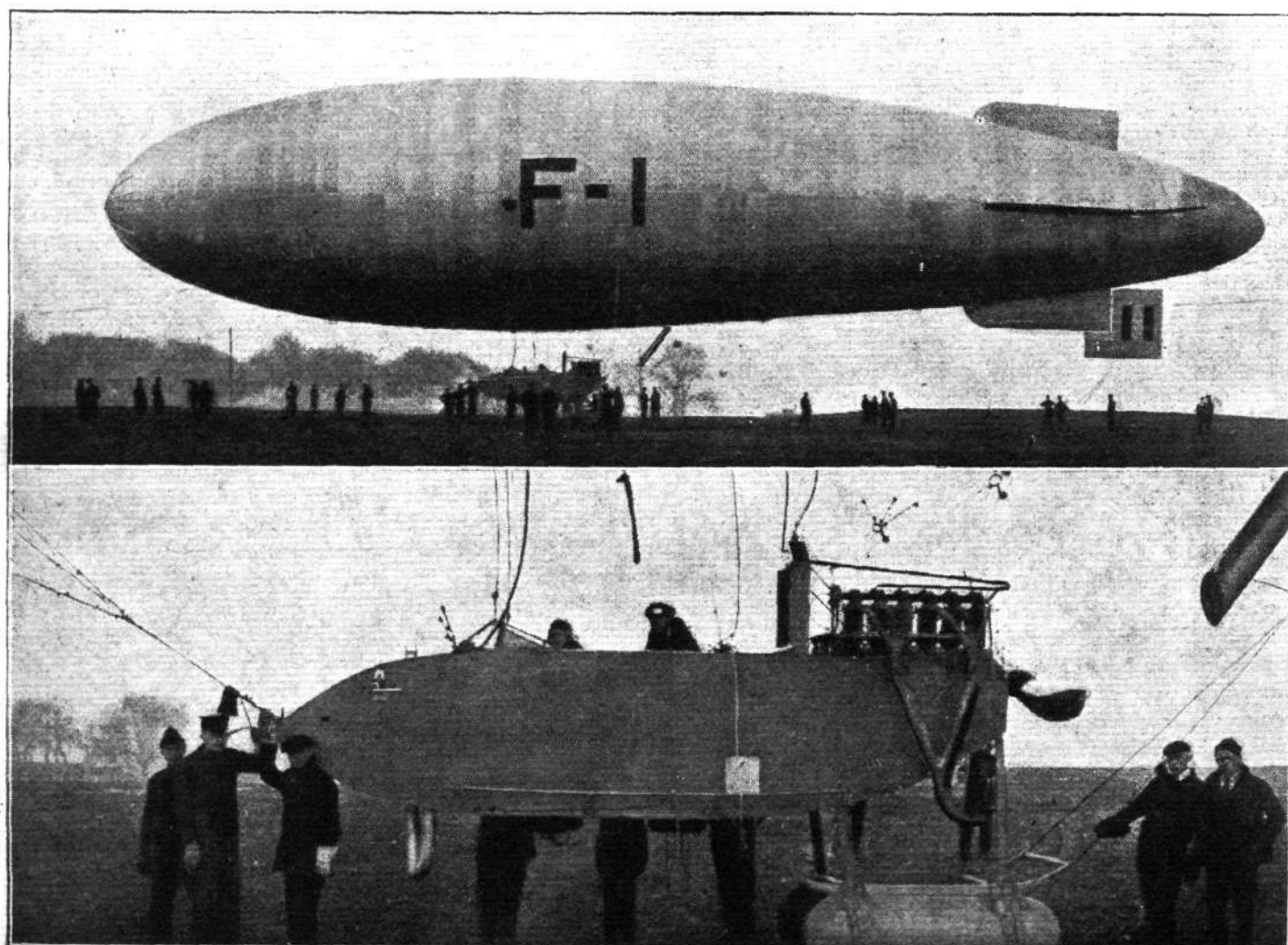
An improved U.S. Navy B-Class Dirigible with single double-cambered fins

#### Improvements in B Class

The improvements of most interest were those which led to an increase in speed. The first ships had a speed of about 40 m.p.h. It was found that one of the vertical fins could safely be left off, thus cutting down the resistance of one fin and its supporting wires. Later the car was suspended closer to the envelope, shortening the suspension and saving resistance. Still later, the suspension itself was simplified and knots and loops cleaned up. A somewhat longer and easier form of envelope gave greater lift and probably less, or at least no more, resistance. The air pipes to the ballonets

were placed inside the envelope to save resistance. Improved propellers were developed also. The air scoop finally became only a short sheet metal tube hinged to the envelope proper, which could be let down into the slip-stream of the propeller or pulled up out of the way, greatly decreasing the resistance and weight of the ship by eliminating the scoop under the car, the blower and air line to the bag.

As a result, the speed was progressively raised from 40 miles to 48 miles with the same engine. The designed maximum speed was 45 m.p.h., but the contractors were required to guarantee 35 only.



The F-1 pusher type dirigible, a modification of the B-Class. Below a view of the car



A gratifying feature of the construction was the weight. If the ships had run over the designed weight their usefulness would have been seriously compromised. Fortunately, all ships, including the first of the series, showed a useful lift in excess of the designed load. In some cases it appeared that the structural weights would run over, but in those cases the buoyancy also ran somewhat in excess of the designed figures, leaving a good margin for the useful load.

The ships in service have more than fulfilled all expectations. Designed to cruise for 16 hours, a record on patrol of 40 hours has been made with one of them at Key West. Aside from the short life of the fabric on some of the first ships, which was replaced, the ships have stood up well, and seven are still in use. One Goodrich ship was in continuous service with its original envelope for fifteen months. Another ship made by Goodyear kept one inflation of gas for nine months, and during this time was in the air 743 hours.

The Navy's first attempt to design, build and operate airships has been fraught with difficulties, but has been on the whole very successful. This is to some extent due to the modest size selected for the first attempt, but mainly to the energy and enthusiasm of the people concerned, both in and out of the service. The B class airships, as these 16 were called, were used at home for training and coast patrol. In France our air forces operated French ships, and in England English ships. But though the B ships had no direct War service, they contributed their mite by training our pilots so that they could go abroad and take over immediately the operation of the foreign types. About 170 pilots were so trained in the United States on B ships before

the Armistice. In addition, B ships were used on coast patrol, and flew over 13,600 hours, or about 400,000 miles.

The B class airships are in no way an improvement over contemporary English airships of the same type, and are in some respects less handy and simple, though of greater carrying capacity and endurance. The only noteworthy features are the conditions of their design, manufacture and initial operation. The ships were put into production from plans without waiting for the perfection of an experimental ship.

From the beginning the manufacture of a rubberised fabric for the envelope was recognised as the principal technical difficulty. The rubber companies had considerable experience in proofing fabric, but had never attempted anything to meet the rigid requirements now in effect. The specifications called for a life of six months in service, with high strength value and a low hydrogen permeability. The French specifications were copied exactly as to fabric. It was soon found that if over-cured the permeability was good but the life short, and *vice versa*. The quality of the fine cotton cloth used made trouble, and there were other difficulties which at the time seemed very serious but are now forgotten.

All contractors succeeded in doing what they had undertaken: to produce fabric in accordance with the specifications. The first few envelopes from one contractor perished quickly, but were promptly replaced with fabric coated with a different compound developed from this experience. Since then progress has been continuous, as more information has been obtained from our own experience and research and from abroad.

(To be continued.)

## Personals

### Death

To Lieut.-Col. JOHN CYRIL PORTE, late R.A.F., who died on October 22, aviation in general, and the flying-boat in particular, owes a great deal. Born at Brandon, Cork, on February 26, 1884, Lieut.-Col. Porte first turned his attention to aviation when serving in the submarine section of the Royal Navy. He experimented with gliders, and learned to fly in 1910, after building a small machine of the Santos-Dumont Demoiselle type. He actually qualified for a pilot's certificate in France in 1911 on a Deperdussin monoplane. He flew this make of machine in the circuit of Britain of 1911, and in the Military Trials of 1912. In 1914 he went to the United States with a view to making a flight across the Atlantic on a flying-boat, built by the Curtiss Co. under his supervision. On the outbreak of War Lieut. Porte returned home and on rejoining the R.N.A.S. set to work to develop the flying-boat for naval purposes. For some time he was in command at the R.N.A.S. station at Hendon, but then went to Felixstowe, where the "Felixstowe Fury" was developed. On the formation of the R.A.F. he became Lieut.-Col. He was an Associate Fellow of the Royal Aeronautical Society.

### To be Married

The engagement is announced between Lieut. J. A. V. BODDY, D.L.I. and R.A.F., son of the Rev. and Mrs. A. A. Boddy, All Saints' Vicarage, Sunderland, and MARJORIE D'ARCY, younger daughter of Mr. and Mrs. A. J. EWEN, of Leicester.

The engagement is announced between Mr. M. W. H. EVANS, late Lieut., R.N.A.S., only son of Mr. W. J. Evans, C.B.E., and Mrs. Evans, of Glencourt, Brondesbury Park, and NANCY, elder daughter of Mr. and Mrs. R. J. LINDSELL, of Fairfield Bury, St. Ives, Huntingdonshire.

### Items

SIR RICHARD GLAZEBROOK, late director of the N.P.L. at Bushy House, Bushy Park, is to be presented, in December, by the staff with his portrait in oils, the work of his cousin, Mr. H. Glazebrook.

The will of Lieut. the Hon. EDMUND WILLIAM CLAUDE GERARD DE VERE PERY, Viscount GLENTWORTH, 24, eldest son of the Earl of Limerick, R.A.F., formerly of the Warwickshire Yeomanry, of Dromore Castle, Limerick, Ireland, has been proved at £725.

## AERODROMES IN THE UNITED KINGDOM

THE Air Ministry announces that the following lists of aerodromes are issued as an addition or in amendment of the lists already published.

LIST B.—Service Stations also available for Civil Use (Amendments).

The following aerodrome has been transferred to List E, and is now published in that list:—

Aerodrome.	Nearest Railway Station.	Nearest Large Town.
Sherburn-in-Elmet.	Sherburn-in-Elmet.	Selby

LIST C.—Aerodromes temporarily retained for Service purposes (Amendments).

The following aerodromes have been transferred to List E, and are now published in that list:—

Aerodrome.	Nearest Railway Station.	Nearest Large Town.
Lake Down.	Amesbury.	Salisbury.
Newhaven (S).	Bishopstone.	Newhaven.
Sedgeford.	Sedgeford.	Hunstanton.
Yatesbury.	Calne.	Marlborough.

Reference: (S) = Seaplane Station.

LIST D.—Aerodromes licenced as suitable for "Avro (504) K" and similar types of Aircraft" only. Except in very few instances accommodation does not exist. The licences have also in the majority of cases been issued for limited periods only.

Aerodrome.	Location	Nearest Town.
Brighouse.	Stoney Lane.	Halifax.
Leamington.	Polo Ground, Radford Road.	Leamington.

LIST E.—Stations no longer in use by the R.A.F.

These stations have been passed to the Government Property Disposal Board. They will be relinquished as soon as the Government property thereon has been disposed of. In many cases the aerodromes are now under cultivation, but it is probable that the sites still form the best emergency landing grounds in the immediate neighbourhood.

Aerodrome.	Station.	Town.
Lake Down..	Amesbury ..	Salisbury.
Newhaven (S) ..	Bishopstone ..	Newhaven.
Scapa Flow (S) ..	Thurso (by boat) ..	Kirkwall.
Sedgeford ..	Sedgeford ..	Hunstanton.
Sherburn-in-Elmet	Sherburn-in-Elmet	Selby.
Yatesbury ..	Calne ..	Marlborough.

Reference: (S) = Seaplane Station.

## THE SAUNDEAR CARBURETTOR

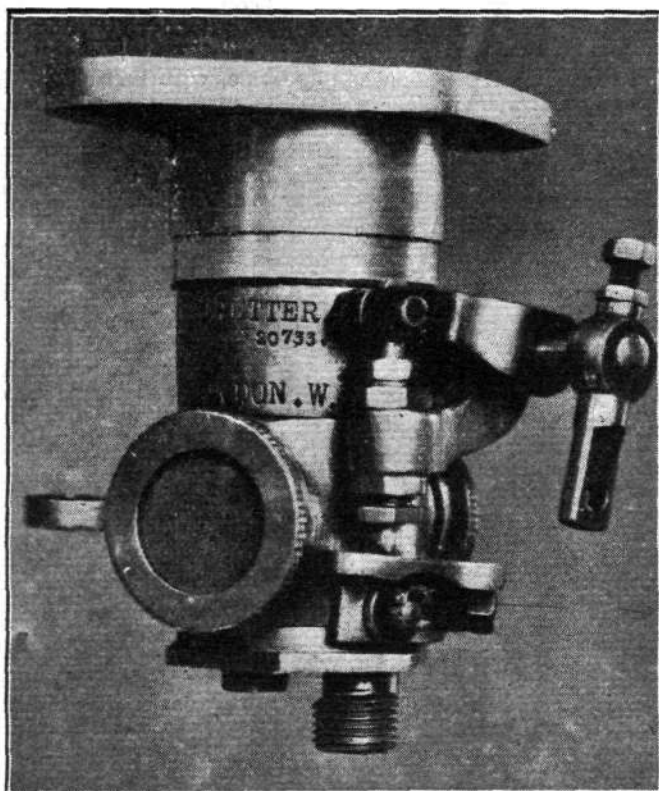
To many, a carburettor without a float would seem to be very much of the order of *Hamlet* without the Prince, but for aviation work, where a machine has often to be upside down, it is recognised that a float is not an unmixed blessing. For that reason alone, therefore, the carburettor invented by Mr. Albert Saunders, now being placed on the market by the Saundear Carburettor Co., of 24, Parker Street, Kingsway, W.C., is more than usually interesting. It possesses other qualities, however, equally important from the aviation point of view, one of the chief being the fact that, owing to the

the further the stem is raised. The petrol then mixes with the main air, which is passing through the main body of the carburettor to the intake-manifold.

The pilot supply works in a somewhat similar manner. Immediately the engine is turned over, the suction is sufficient to raise the small valve E and to draw petrol up the hollow stem D through the adjustable jet F, past the valve and out, by G, into a stream of air drawn up through the pipe H, which completely breaks up the petrol into a fine spray.

The adjustment of petrol and air is equally ingenious. It will be seen from the photograph that on the side of the throttle sleeve there is fixed a ledge, along which slides a pin raising or lowering a lever which, through the lever J, in its turn opens or closes the valve B. The inclination of this ledge can be varied to give a very fine adjustment by means of an eccentric nut.

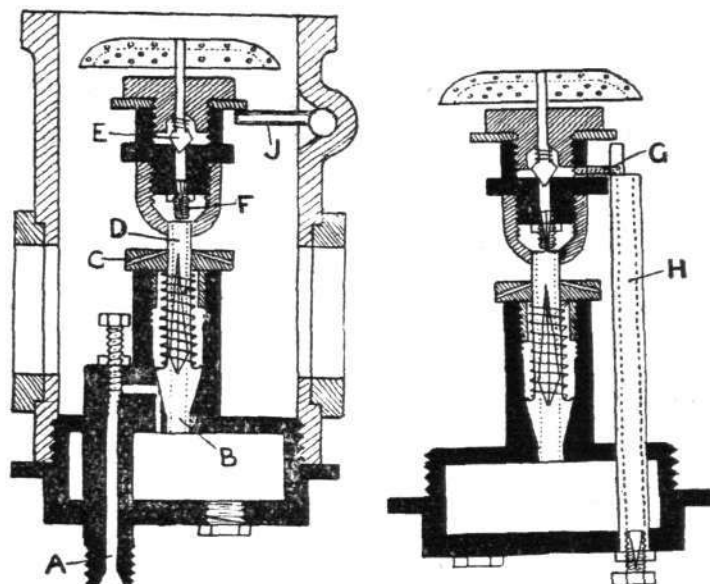
By this arrangement the opening or closing of the throttle valve automatically varies the supply of petrol, and so the mixture is correctly proportioned to suit any position of the



The Saundear carburettor, complete with flange for attachment to inlet pipe

petrol being cut off when the engine is not running, it is practically impossible for a fire to occur. This will be made clear from the following description.

The general neatness and compactness of the carburettor itself can be gathered from the photograph, while the sectional drawings illustrate the working of the interior arrangement. The petrol flows through the pipe A and past the valve B, which is lifted by the suction of the engine. It is then drawn up through the V-shaped variable grooves, which, as they pass through the collar C, form virtual jets increasing in area



THE SAUNDEAR CARBURETTOR: On the left section showing the main petrol supply, and on the right showing the pilot jet

throttle, once the carburettor has been properly set to suit the engine. It is claimed that, by reason of this inter-connection between the supply of petrol and the quantity of air admitted to the carburettor, the possibility of carbon being deposited in the engine is practically eliminated.

It is claimed that one result of the absence of a float level is that as soon as the engine is cranked the petrol is sucked up, filling the cylinder with an explosive charge, and thus ensuring a start at once.

### Aircraft Disposal

THE Aircraft Disposal Department, Ministry of Munitions, has been transferred from York House, Kingsway, to the Welcome Club, Earl's Court Exhibition, West Kensington. This Department has now for disposal huge stocks of aeroplanes, aeroplane engines and equipment.

### Avros at Brighton

ON Saturday, October 25, the Avro air fleet visited Brighton for the third successive week-end. The new aerodrome at West Blatchington Farm, which consists of about 50 acres, is being fenced round and hangars are being erected there. Tea was served on the ground and a band was present.

A very large crowd collected on the aerodrome for each of the three days. Owing to the high wind the parachute descents had to be postponed, but Maj. A. G. Taylor, A.F.C., put up a very fine exhibition of trick flying.

The chief interest, however, centred in the appearance of the little Avro-Green Baby, which had been brought down from Hamble by Capt. Hamersley, M.C. The Baby played about in the air as usual, and delighted the crowd immensely. Another attraction was the display of the model aeroplane kites designed by an A.I.D. official at Hamble. These were made to perform most extraordinary feats in the air.

Next week-end the Avros will visit Bournemouth; the contemplated visit to Eastbourne could not be arranged.

### A Carnival at Manchester

THE northern Avro fleet held a carnival at Alexandra Park aerodrome last week-end for the benefit of the Manchester and Salford Hospital Saturday Fund. Over 9,000 people paid for admission, and passenger flying went on briskly till dusk came on, leaving many applicants for tickets disappointed. About £300 was handed over to the hospital fund. The flying display was as fine as was to be expected from the Avro pilots. Another display will be given on the same aerodrome next week-end.

### A Vickers-Vimy Touring the Continent

A VICKERS-VIMY bomber, which is to make a tour of Europe, giving demonstration flights at the chief centres, left Hounslow at 10.30 a.m. on October 17, and arrived at Paris at 1.10, the trip having taken 2 hours 40 mins. The machine, which carries two pilots and one mechanic, after giving exhibition flights in Paris went on to Bordeaux and then to Biarritz.

### Under a Swedish Bridge

A BRIEF message from Stockholm states that Captain Saunders, a British airman, with a De Havilland aeroplane, on Monday performed the first "bridge flight" in Sweden by flying through the arch of a railway bridge near Stockholm.



# THE STATIC HEAD TURN INDICATOR FOR AEROPLANES\*

By SIR HORACE DARWIN, K.B.E., F.R.S.

AN instrument to indicate whether, under all conditions, the path of the aeroplane is a straight line or whether it is turning to the right or left is much required. It is well known that when flying in a cloud or at night, and no fixed object is visible, even the most experienced pilot may, without realising it, be flying on a sharp curve. If, however, the angle of banking is great the muscular reaction of his body will have to be increased to counteract the increased force acting on it. This will tell him that his course is not straight, but there is nothing to show whether he is on a right-hand or left-hand turn. If he tries to straighten his course he is just as likely to increase the curvature as to straighten out. If he observes his compass he will probably find that it is swinging so much that it will tell him something is wrong, but give no guide to what he should do.

A turn indicator enables a straight compass course to be kept when flying in clouds or at night, and this is valuable for long-distance flights. But straight flying is always important. If the clouds are low and the aeroplane leaves their lower surface when on a sharp turn there may not be sufficient time to allow the machine to be put into a safe position for landing before the ground is reached.

The late Capt. Lucas, D.Sc., F.R.S., proved that when flying in a northerly direction the compass turned with the aeroplane, and when flying in a southerly direction the opposite took place. Before he investigated the subject at the Royal Aircraft Establishment all that was known was that the compass became unreliable in cloud flying; he found what the facts were; discovered the cause of the behaviour of the compass and designed and made a compass which was a very great improvement on the compass then in use, although it did not completely overcome the difficulty. This scientific achievement was of the greatest value to the flying service. It was when doing such work as this that he was killed, and the country lost a brilliant scientific man.

In June, 1912, a memorandum by Mr. C. C. Mason and myself was submitted to the Advisory Committee for Aeronautics. In it the principle of the static head turn indicator was explained. At a latter date Dr. Lucas tried some experiments with the manometer supplied by me, a very different one from that now made by the British Wright Co. This manometer was crude and bad in principle, and broke down after a short trial, but showed some promise. The experiments were not continued owing to press of other work, and because I think even he did not then realise the value of a satisfactory turn indicator, and I certainly did not.

The object in view at that time was to obtain the true vertical for bomb dropping. Major Dobson tried some interesting experiments at Upavon with very simple apparatus. Later I made an elaborate instrument which was probably too difficult to manipulate.

Very many attempts have been made to make instruments which would show the true vertical when flying in a circle. If a pendulum hanging from a support on an aeroplane would always point in the true vertical direction it would be easy to make an instrument which would show whether the wings were level. But it is well known that this is not the case; on a truly banked turn the pendulum will remain at right angles to the plane of the wings, and the pendulum will only show whether the aeroplane is under or over banked. Many inventors have suggested pendulums, or their equivalents, such as a level, or bubbles rising through a vessel containing a liquid, or a flame which points vertically upwards. Very few of the inventors of these instruments realised the fundamental difficulty, and those few who did, failed to overcome it.

Another possible method is to make use of the fact that on a turn the apparent attraction of gravity is increased. The index of an ordinary spring balance supporting a weight would move when on a banked turn, and show a greater weight than when flying straight. In this case a left and right turn would have the same effect. Also the indication would be very small for turns of large radius. The vertical acceleration, especially on bumpy days, would have a far greater effect than even sharp turns.

It has also been proposed to measure the banking angle by an electrometer giving the difference of the electro-static potential at the wing tips. This method was, however, not found to be a success.

Successful turn indicators using gyroscopes have been made.

\* Paper read before the Royal Aeronautical Society at the Royal Society of Arts on Wednesday, October 29, 1919.

We will now describe the static head turn indicator.† In conjunction with a good aeroplane compass and a cross level, a true compass course can be kept in clouds or at night. The success of this instrument is due to the large amount of experimental work done at Orfordness and at the Royal Aircraft Establishment, and to the design of the Ogilvie pressure gauge manufactured by the British Wright Co. Unless a pressure gauge as good and as sensitive as this instrument had been designed, the turn indicator would not have been a success.

A great number of experiments had to be tried in order to determine the best position for fixing the static heads, on the relative advantages of fixed and swivelling static heads, and on the effect of side-slip.

A sensitive differential manometer is fixed on the instrument board, and the Ogilvie pressure gauge is used for this purpose. The two openings from it are connected to two static heads, fixed to the wings as far apart as can conveniently be arranged, and in a position so that the air pressure at these points is influenced as little as possible by the wings or body of the aeroplane. The manometer will then indicate a difference of pressure when the aeroplane is turning. The hand will move in one direction for a turn to the right and in the other direction for a turn to the left.

The pressure gauge was designed by the British Wright Co. for use with the turn indicator, and is of the Ogilvie type. An extremely sensitive circular rubber diaphragm separates two chambers in the instrument. These chambers are connected, one to each static head, and the minute difference of pressures caused by the aeroplane turning deflects the diaphragm by a small amount. The deflection is communicated directly by a silk thread, without intermediate gear, to the indicating hand and moves it to the right or the left. The scale carrying the zero mark and divisions is adjustable by the pilot during flight by the use of one thumb, and he can easily set the scale in the correct position when flying on a straight course immediately after leaving the ground. This adjustment is most desirable, as it is found that the position of the hand when on a straight course does not correspond with absolute equality of pressure on the two sides of the diaphragm.

This is due both because it is impossible to make both static heads absolutely similar, and also because the actual static pressure at the two positions where the static heads are fixed are not equal. No doubt if it were possible to fix the static heads at a great distance in front of the wings the amount of adjustment required would be greatly reduced. The adjustment required is seldom more than 10°.

The air inside the static openings is very nearly the true air pressure outside in a well-designed static opening. The static heads used are the same in form as those used in the standard air-speed indicator. The tube moves through the air in the direction of its axis; the stream-line end of the tube disturbs the air as little as possible, and thus the air passes over the holes in the side of the tube at right angles to their direction. It had been found by experiment that the air pressure inside the tube is very nearly the true pressure outside, whatever the velocity the tube moves through the air may be.

A great authority on birds tells me that he has no doubt that birds breathe through their nostrils. He might find it difficult to actually prove this, but it is very unlikely that he is not correct. It is an interesting fact that the nostrils of birds fulfil to some extent the conditions of a well-designed static opening; the nostrils are holes in the beak, and in flight the beak moves through the air point forwards. It is clear that this arrangement is advantageous to the bird. To ensure ease in breathing, the air inside the lungs should be at the same pressure as the air outside. I do not know whether men in aeroplanes find any difficulty in breathing when the head is in the wind. If they do, no doubt the difficulty could be reduced by breathing through properly constructed static openings.

Experiments were tried with fixed static heads, as it was hoped that the swivelling form was not necessary. They were fixed to the struts between the wings, but in this position side-slipping had a considerable effect; in some cases this was so great that the index of the pressure gauge showed a

† Secret Patent (applied for March 20, 1918) was taken out for this invention. The Patent No. 123,996 was published on April 10, 1919. In the Service it is known as the "Aero Turn Indicator with Mark I and Mark II Static Heads."

right-hand turn when a left-hand turn was taken. The fixed static heads were then placed in front and above the leading edge of the upper wing. In this position the results were much better, but the heads must be truly parallel. In this exposed position it was found that they were liable to become accidentally displaced, and as this might easily happen without the pilot knowing it, then the instrument would not be trustworthy. When swivelling heads are used and placed in the standard position, the effect of side-slip is greatly reduced, and turns to the right or left are correctly indicated. To eliminate all effect of side-slip the static heads must be put inconveniently far from the wings.

The swivelling static heads are required to adjust their angle with the greatest freedom. They are carried by swivelling bearings allowing universal movement, and fixed to rigid standards. The air is always free to flow by way of a rubber tube which twists to accommodate the adjustment of the head to right and left, and bends to permit of inclination up and down. The static head, thus free to move in all directions, is maintained parallel to the direction of the wind by means of a conical vane. Its weight has no tendency to move it out of the true direction as it is carefully balanced about its swivelling bearings.

It was also found important to avoid sharp bends or constrictions in the tube, as otherwise the indication on the dial was sluggish. The air tube on the static head openings becoming blocked with ice is a possible cause of failure.

Some of the earlier experiments were made with venturi tubes instead of static openings at the ends of the air tube. This will reduce the air pressure at both the outer ends of the air tube, and it will reduce it most at the end which is moving fastest through the air. When flying in a circle, the outer wing tip is moving faster than the inner wing tip, and the air in the air tube will be drawn outwards, and this will cause a pressure on the manometer. This pressure will be in the same direction as the pressure caused by the centrifugal force, and the two pressures will be added together and the effect will be greater than when static heads are used. The result is that the pressure on the manometer is increased, and this is an advantage.

This arrangement was tried, but the readings on the manometer were found to be much more unsteady, and for this reason the instrument was less satisfactory than when static heads were used.

Major G. I. Taylor has investigated the question of gusts and eddies in the air. In a gust the static pressure as well as the velocity vary. When static heads are used the change of velocity has no effect on the air pressure in the air tube, and unsteadiness of the manometer readings is only caused by the variation in the pressure. With venturi tubes, both the variation of velocity and pressure will cause unsteadiness. It has been found that the fluctuations in static pressure due to gusts are of the order of  $\rho u^2/2$ , where  $u$  is the fluctuation of the velocity in the gust. The velocity of the gust may increase or diminish the velocity of the venturi tube through the air, depending on the direction of the gust; and may even have opposite effects on the ends of the air tube, increasing the velocity at one end and diminishing it at the other.

If the velocity of the venturi tube through the air is  $v$  and a gust of velocity  $u$  meets it, then the velocity through the air becomes  $v + u$ . The reduction of pressure in a venturi tube is approximately proportional to the square of the velocity of the air. The reduction of pressure is  $\frac{1}{2}\rho[(v + u)^2]$  or  $\rho v u$  as  $u$  is small compared to  $v$ . With a quick-flying aeroplane  $v$  is very large, and the reduction of pressure will be by no means small even if the velocity of the gust is very small, and we should expect the pointer of the manometer to be unsteady.

It follows from the foregoing that we should expect this unsteadiness to be from 10 to 20 times as great with venturi tubes as with the static heads, and this has been verified by tests in the air.

Small differences of pressure have to be measured, and as venturi tubes are very sensitive to change of shape, it would also be very difficult to make them sufficiently alike.

It is found also that in actual practice a venturi tube gives an unsteady suction even in a uniform wind. This is probably caused by the flow of the air through the venturi tube becoming unstable at some velocities. Pitot tubes for this reason also, are better than venturi tubes.

A manometer has been made sufficiently sensitive to indicate turns of large radius, and as steadiness of the readings is of very great importance, it is far better to use static heads than venturi tubes.

In order to make the action clear, we will assume that the aeroplane is moving in a circle, that it is not banked, and that the air tube connecting the static heads is horizontal

and points along a radius of the circle. The forces acting on the air in this tube are:

1. Gravity acting vertically downwards. As the tube is horizontal this will cause no difference of pressure at the manometer or cause any tendency of the air to move along the tube.

2. The atmospheric pressure at the static heads. As the tube is horizontal the pressures at the ends of the tube are equal and in opposite directions, and no effect is produced on the manometer.

3. The pressure of the inner surface of the tube against the air; this clearly has no effect on the manometer.

4. Centrifugal force is the one remaining force which can cause a movement of the differential manometer. The air will tend to move along the tube in an outward direction and can only be prevented from so doing by a difference of pressure on the two sides of the diaphragms in the manometer. It is this difference of pressure which is indicated on the manometer and shows a right or left-hand turn.

All turns, however, are banked, and this assumption is only made to make the action clear.

Let us now consider a banked turn and assume that the aeroplane is banked at the correct angle. By the correct angle is meant an angle which causes no side-slip; that is such an angle that the apparent direction of gravity (that is the resultant of gravity and centrifugal force) is at right angles to the plane of the wings.

Again consider the forces acting on the air in the tube.

1. As the banking is at the correct angle, the resultant of gravity and centrifugal force act at right angles to the direction of the tube and have no effect.

2. The pressure against the inside of the tube clearly has no effect.

3. The atmospheric pressure at the two static heads is not equal; as the aeroplane is banked, the outer end is higher up and at a place where the air is at a less pressure. The differential manometer will show this difference of pressure.

Or we can consider this last case differently. The forces acting on the air in the tube are:—

1. Gravity acting on the air in the tube. As the tube is banked this will tend to make the air flow inwards.

2. Atmospheric pressure at the static heads. As the pressure at the outer end is less than at the inner end these pressures will tend to make the air flow outwards. The tendency of (1) and (2) are obviously equal and in opposite directions, and the combination of the two will have no effect.

3. The pressure against the inside of the tube clearly has no effect.

4. Centrifugal force is the only remaining force, and this clearly will cause a difference of pressure on the two sides of the diaphragm of the manometer. Although these two ways of considering the forces which act on the air in the tube are so different they are both correct.

If  $V$  = the speed of the aeroplane.

$r$  = radius of the circle in which it is flying.

$b$  = the distance between the static heads.

$\rho$  = the density of the air.

$P$  = the differential pressure on the air required to prevent its movement along the air tube.

$\beta$  = the angle of banking.

With horizontal flight, no side-slip and the air tube in the vertical plane passing through the centre of the circle.

$$P = \frac{1}{2}\rho b \cos \beta \frac{V^2}{r}$$

Usually  $\beta$  is the correct banking angle, then  $\tan \beta = \frac{V^2}{gr}$ . In order to make  $P$  large,  $b$  must be large. As the density of the air becomes less with increased height the indications will also become less.

The instrument can only be used for measuring  $r$  if we know the speed and the density of the air, but it is not wanted for this, and is only useful for showing that the aeroplane is turning to the right or the left.

If an aeroplane is flying near the ground at 80 m.p.h. in a circle of one mile radius, a complete circle would be flown in  $4\frac{1}{2}$  mins., and the correct banking angle would be  $4^\circ-40'$ . If the static heads are 30 ft. apart the air pressure in the manometer would be about 1 mm. head of water when flying near the ground. This pressure will move the head on the dial through about  $1\frac{1}{2}^\circ$  or about  $1\frac{1}{2}$  divisions, and the turn will be clearly shown. If the height of the aeroplane is so great that the density of the air is reduced to half its normal amount the indication will also be reduced to one-half.

The turn indicator has been tried on many different types of aeroplanes. The following are some extracts from a report which we have been kindly allowed to see and quote:—

"In connection with the daily cloud and horizon observations, it has been necessary to attempt to fly through thick layers of cloud. This has been tried on several types of



scouts, and after considerable practice it was found possible to get through several thousand feet of solid cloud, but it required very rigid concentration on the control of the machine, even then it frequently got out of control, and after losing height, climbing had to begin again. It was practically impossible to have any sense of direction during a long climb in cloud. Layers of cloud of various thicknesses up to 6,000 ft. were got through, but it was decidedly unpleasant flying."

The turn indicator was then fixed to a 110-h.p. Le Rhone Camel, a difficult scout to fly through clouds. The first position of the static heads was not found satisfactory. A second position was tried. The report goes on:—

"Although not extremely sensitive, it was most useful, enabling the machine to be flown in comfort for a considerable time in clouds. . . . As compared with the experience in

clouds on scouts without turn indicators, flying in clouds was now quite pleasant, as the machine never showed any sign of getting out of control. To fly straight was quite easy, keeping a fairly reasonable compass course, to make a gentle spiral up or down, or a very steep spiral. . . .

"The static heads were only tried in two positions, but it may be that a position could be found without their being unreasonably far in front of the plane, so that the indicator would be more sensitive.

"It would need some considerable practice before the average pilot could take a Camel, or most scouts through much cloud, but it makes cloud flying on scouts possible, whereas without turn indicators it is practically impossible."

I have received most kind help in writing the above from Mr. Griffith Brewer, Squadron-Leader Stewart, Major Dobson and Mr. C. C. Mason.



## AVIATION IN PARLIAMENT

### Air Ministry Reductions

MR. GILBERT, in the House of Commons on October 22, asked the Under-Secretary of State for the Air Ministry whether he will state what reduction in staff has taken place in his Department, including those employed at depôts, since November 11, 1918; and whether he is taking any steps to make further reductions?

The Under-Secretary of State for Air (Maj.-Gen. Seely): I am not sure what my hon. friend means by "including those employed at depôts," but I assume that this is to be interpreted as including all persons employed. Since November 11, 1918, the numbers employed by the Air Ministry at headquarters and depôts have been reduced from 68,150 to 24,700 on September 30, 1919. These are approximate figures since all returns are not made up to the same date. Further reductions have been made since September 30, and the process is continuing as rapidly as possible.

### Royal Air Force

MR. CLOUGH asked the Under-Secretary of State for the Air Ministry if he will inform the House what was the strength of the personnel of the Air Force on October 18; what it was on August 12, 1919; and what it was on the date of the Armistice?

Maj.-Gen. Seely: The particulars asked for by my hon. friend as to the strength of the Royal Air Force on the dates mentioned by him are as follow:—

	Officers.	Other ranks.
Date of Armistice .. .. .	30,122	263,410
August 12, 1919 .. .. .	9,044	39,671
October 18, 1919 .. .. .	6,005	31,976

An Hon. Member: Can he say whether all the anti-aircraft stations have now been abolished in this country?

Maj.-Gen. Seely: I could not say that without notice. It does not come under my Department, but under the Home Forces. It ought to be put down to the Secretary of State for War.

Sir W. Joynson-Hicks: How many women are included in that last total?

Maj.-Gen. Seely: I could not say that without notice.

### Army, Navy, and Air Force (Revised Estimates)

MR. ARNOLD asked the Prime Minister when the revised and detailed estimates for the Army, Navy and Air Force will be introduced; and what opportunities will be granted for their discussion?

MR. CHAMBERLAIN: I hope that the Naval and Air Force Estimates will be presented early next month. I am informed by the War Office that the Army Estimates cannot be ready before the end of next month, but my right hon. friend the Secretary of State for War will lay a Paper explanatory of Army expenditure at the same time as the Treasury Papers on the financial position which I propose to lay.

### Women's Royal Air Force

MR. COMDR. KENWORTHY, on October 23, asked the Under-Secretary of State for the Air Ministry how many women, officers and other ranks, respectively, were in the Women's Royal Air Force on October 1, 1919; and how many women, other than those in the Women's Royal Air Force, were employed by the Royal Air Force on the same date?

The Under-Secretary of State for Air (Maj.-Gen. Seely): The numerical strength of the Women's Royal Air Force on September 30, 1919, was:—

Officers .. .. .	164
Other ranks .. .. .	5,800

It is proposed to reduce this number to 400 by December 1, and to 200 by January 1, 1920. The number of female civil subordinates on the same date was 2,529.

Lieut.-Comdr. Kenworthy: Are we to understand that the 400 and 200 respectively apply to all ranks, or only to officers?

Maj.-Gen. Seely: Of course, to all ranks.

### Demolition of R.A.F. Aeroplanes

MR. ALFRED T. DAVIES, on October 27, asked the Under-Secretary of State for the Air Ministry whether large numbers of aeroplanes have been destroyed by burning in the occupied districts of France and Belgium; whether aeroplanes of the newest type were being delivered under contracts until the summer of this year; and whether the Canadian Government, adopting a different policy, disposed of similar aircraft with commercial advantage?

The Under-Secretary of State for Air (Major-General Seely): In answer to the first part of my hon. friend's question, instructions have been given: (a) that any aircraft declared obsolete for all purposes (i.e., Air Force and civil) shall be reduced to produce, and the produce handed to the Disposal Board; and (b) that any aircraft totally wrecked and beyond repair shall be reduced to produce, and the wreckage burned after removal of all parts of value. The number of crashed aircraft burnt after the removal of the valuable parts under (b) has been 28. In addition, since July 1, 1919, the residue of 259 crashed and 359 deteriorated or obsolete machines has been burnt after the valuable parts had been removed. The answer to the second part is in the affirmative. I have no official knowledge of the matter referred to in the third part of my hon. friend's question, but I think he has in mind a transaction carried out by the representative of the Ministry of Munitions in Canada on behalf of His Majesty's Government. If I am correct, I would refer him to the Minister of Munitions.

### Commercial Aviation and Government Assistance

COL. BURGOYNE asked the Under-Secretary of State for the Air Ministry whether any subsidy, or advantages in lieu of subsidy, is being made by the

Government to aviation firms for the development of commercial aviation; and if so, which are the firms and what is the nature of the subsidy?

Major-General Seely: The answer to my hon. and gallant friend is that whilst no direct subsidies are being made by the Government for the development of civil aviation, assistance is given to all firms desirous of receiving it in the following directions: The free supply of meteorological information and free communication services (i.e., wireless, signals, flying directions, etc.). Arrangements are also in hand for the establishment of a system of emergency landing grounds throughout the country which will be open to all firms who wish to make use of them. At Government aerodromes, other than those required purely for R.A.F. services, aerodrome facilities and shedding are available for all firms on lease, thus saving them a considerable proportion of the initial capital expenditure.

An Hon. Member: What is the contemplated cost of all these advantages which are being offered to these private firms?

Major-General Seely: The cost is comparatively small, as my hon. friend will see if he looks at the list, and the advantages are very great. I can give the hon. member a precise estimate if he likes.

### Sale of R. 38 to the United States

LIEUT.-COL. MOORE-BRABAZON asked the Under-Secretary of State for the Air Ministry whether he has made any arrangements with the United States Government for the building of a rigid airship in this country for the United States Navy?

Major-General Seely: Arrangements have been made between the United States Navy and the Air Ministry by which the Airship R. 38 embodying the newest features in design and construction will be completed without delay. The vessel will be handed over to United States Naval personnel on completion, and will proceed to America with her American crew as soon as the shed to house her is ready. The United States Navy will take over the vessel at cost price, the Royal Air Force undertaking the training of the American Naval personnel free of cost except pay and rations.

### The Route to Egypt (Casualties)

SIR WILLIAM JOYNSON-HICKS, on October 28, asked the Under-Secretary of State for the Air Ministry whether his attention has been called to the statements recently made by Colonel G. L. P. Henderson as to the serious number of deaths to pilots on the new air route to Egypt, and whether he can make a full statement to the House in regard to the whole position?

The Under-Secretary of State for Air (Maj.-Gen. Seely): I cannot go into detail within the limits of a Parliamentary answer, but I shall be glad to make a full statement on the first possible occasion.

The broad facts are these: In the spring and early summer the War Office communicated to us the urgent demands of Egypt for aircraft of large size and endurance in order to cope with the situation, which was described as critical. At the end of March the request was for as many Handley Page machines as could possibly be spared, and at the end of April they telegraphed urgently for additional squadrons. In view of the fact that no Handley Page machine had ever been packed and sent by sea, it was decided that the machines must be sent by air to meet the critical emergency, although considerable risks were necessarily involved.

At the end of April the first squadron was ordered to proceed, and special measures were taken to assist the move of this squadron. An officer with a special and practical knowledge of the route was sent out to arrange for facilities such as landing-grounds, spares, petrol, etc. Flying-boat escorts based on Toronto at first and then on Alexandria were also arranged. The squadron left on May 3. On account of the accidents which occurred, an officer was then stationed at each aerodrome on the route, whose primary duty it was to assist machines in getting through. Great difficulty, however, was experienced by these officers in getting messages by telephone or telegram through in time for action to be taken, and also in getting the necessary spares to the points required, owing to the difficulty of transport. Train communication was equally ineffective. A further difficulty was that owing to rapid demobilisation it was impossible to get the best qualified personnel within the time available. It was further arranged that replacements for the three squadrons who had gone to Egypt should be sent by air by the staging method. Two pilots and a few mechanics were stationed at each staging aerodrome. At the present moment 51 Handley Page machines have left for Egypt; of these 26 have arrived, 10 are on later stages of the route, and 15 have been written off.

A month ago the Chief of the Air Staff requested that a special committee of inquiry should be instituted composed of officers outside his own Department, and that inquiry is now proceeding. I should here like to emphasise the fact that the making of this route had nothing whatever to do with civil aviation, the whole being organised by the Service side. One machine crashed badly, and four lives were lost. Three other bad accidents occurred, involving four fatal and four non-fatal injuries. This loss of life is greatly to be deplored, but it must be borne in mind that the situation was critical, and that prompt action was essential. I am advised that the sending of these machines by sea would have meant that they could not have been ready for action until many months after they were required.

Sir W. Joynson-Hicks: Having regard to the very large loss of life and large cost involved, would not the right hon. gentleman consider the desirability of having a more independent inquiry than that by some officers of the Air Service?

Maj.-Gen. Seely: This inquiry is as independent as it can be. The Chief of the Air Staff realised that it was important to have as independent an inquiry as possible a month ago, owing to the accidents involved in transporting this great number of machines over a practically untried route. The officers who are investigating it—I think they must be officers, because practically everyone who understands the air has been in the Air Service during the War—are outside the Department of the Chief of the Air Staff, and are quite independent of that Department.

An Hon. Member: Who are they?

Maj.-Gen. Seely: I know some of them. If the hon. member will put down a question I will give him full details. The fullest inquiry will be made, and if it be found that a mistake has been made by anyone concerned, from myself downwards, I need hardly say appropriate action will be taken.

Mr. Stewart: How many of the Air Force are missing?

Maj.-Gen. Seely: The machines lost—15—have been totally written off, and others have been damaged. The total casualties so far are what I have given.

Mr. Houston: When the right hon. gentlemen says 15 machines have been written off, does he mean that these machines have crashed?

Maj.-Gen. Seely: It means that they are of no further use—either fallen into the sea or so broken up that they are of no use. Twenty-six have arrived.

## Blandford Camp

MAJ. COLFOX asked the Under-Secretary of State for Air whether large numbers of women are still being conveyed daily to and from Blandford camp from a distance by road; whether the huts at Blandford camp are good enough and large enough to house all the necessary staff on the spot; and whether any considerable reduction has been, or is likely to be, made in the personnel at the camp?

Maj.-Gen. Seely: The answer to the first part of my hon. and gallant friend's question is that about 50 women are conveyed by lorry from Blandford to the camp. They return home by Service train. As to the second part, the women staff are of two categories—mobile and immobile. The former are housed in the camp. The terms of service of the latter do not allow this to be done compulsorily. As the Records Office is shortly to be moved from Blandford, it is not considered desirable to substitute and train fresh mobile staff to take the place of the latter. The answer to the third part of the question is that reductions are continuously taking place, and the women staff show a reduction of 37 per cent. between July 31 and September 30.

## Air Stations, Orkney and Shetland

SIR W. JOYNSON-HICKS asked the Under-Secretary of State for Air whether the aeroplane stations in the Orkney and Shetland Islands are being demobilised; and whether at the same time fresh huts are still being built?

Maj.-Gen. Seely: As I indicated in my answer to my hon. friend's question No. 205, the air stations in the Orkneys and Shetland have been or are being closed down, with the exception of two. No new huts are being built, but at one of the stations to be retained wooden huts from other stations in the Orkneys and three small aeroplane sheds are being re-erected.

SIR W. JOYNSON-HICKS asked the Under-Secretary of State for Air how many air stations there are or have been in the Orkney and Shetland Islands; and what was and is the personnel of those stations?

Maj.-Gen. Seely: The answer to the first part of my hon. friend's question is three, one of which is being closed down as speedily as possible; to the second, eight; to the third, 292 officers and 1,836 airmen; to the fourth, 21 officers and 305 airmen. As soon as all available stores have been evacuated the two stations which are being retained will be placed in charge of care and maintenance parties, except during the months when the Fleet is exercising, at which times the personnel will be temporarily increased.

SIR W. JOYNSON-HICKS asked the Under-Secretary of State for Air what has been the total expenditure during the War on flying in the Orkney and Shetland Islands; whether quite recently numerous masses of stores were left lying out in the open; and whether any estimate can be given of the cost per hour of flying at those stations?

Maj.-Gen. Seely: I regret that it is not possible, without an unjustifiable expenditure of labour, to give my hon. friend the information he asks for in the first and last parts of this question. In regard to the second part, my information is that no large quantities of stores have been left in the open, but I am having further inquiry made on the point.

SIR W. JOYNSON-HICKS asked the Under-Secretary of State for Air whether an inquiry has recently been made in regard to the deficiencies discovered when closing some of the air stations in the Orkney and Shetland Islands; and what is the result of such inquiry?

Maj.-Gen. Seely: A Court of Inquiry was held in the spring of this year into the causes for deficiencies in the stores of the Shetland Wing. The Court found that, owing to the difficulties experienced in the administration of these outlying stations, the system of storekeeping was in certain instances imperfect, with the result that the book and actual stocks did not agree, both deficiencies and surpluses being shown. The amount of the deficiency was about £1,000.

## Woodsford Aerodrome

MAJ. COLFOX asked the Under-Secretary of State for Air if work is still being carried on in connection with the Woodsford Aerodrome, near Dorchester; whether special trains are still being run daily to carry workpeople to their work there; what has been the total cost of this aerodrome; to what use is it to be put; and whether the land not already covered with buildings and no longer required can be handed back and used once more for agricultural purposes?

DR. MACNAMARA: I have been asked to reply, as the Woodsford Aerodrome is in Admiralty occupation. The completion of the aerodrome as an airship station has been abandoned. A few minor works are still in hand to complete the buildings required for use by the Admiralty. Special workmen's trains are not being run; they were stopped on September 13. The approximate total cost of the aerodrome will be £185,000. The station is to be used for the temporary storage of machinery. As regards the land, the farm tenant has never been dispossessed of the portion referred to, and is still in occupation. The requisition cannot, however, be withdrawn until the question of the ultimate disposal of the station is settled.

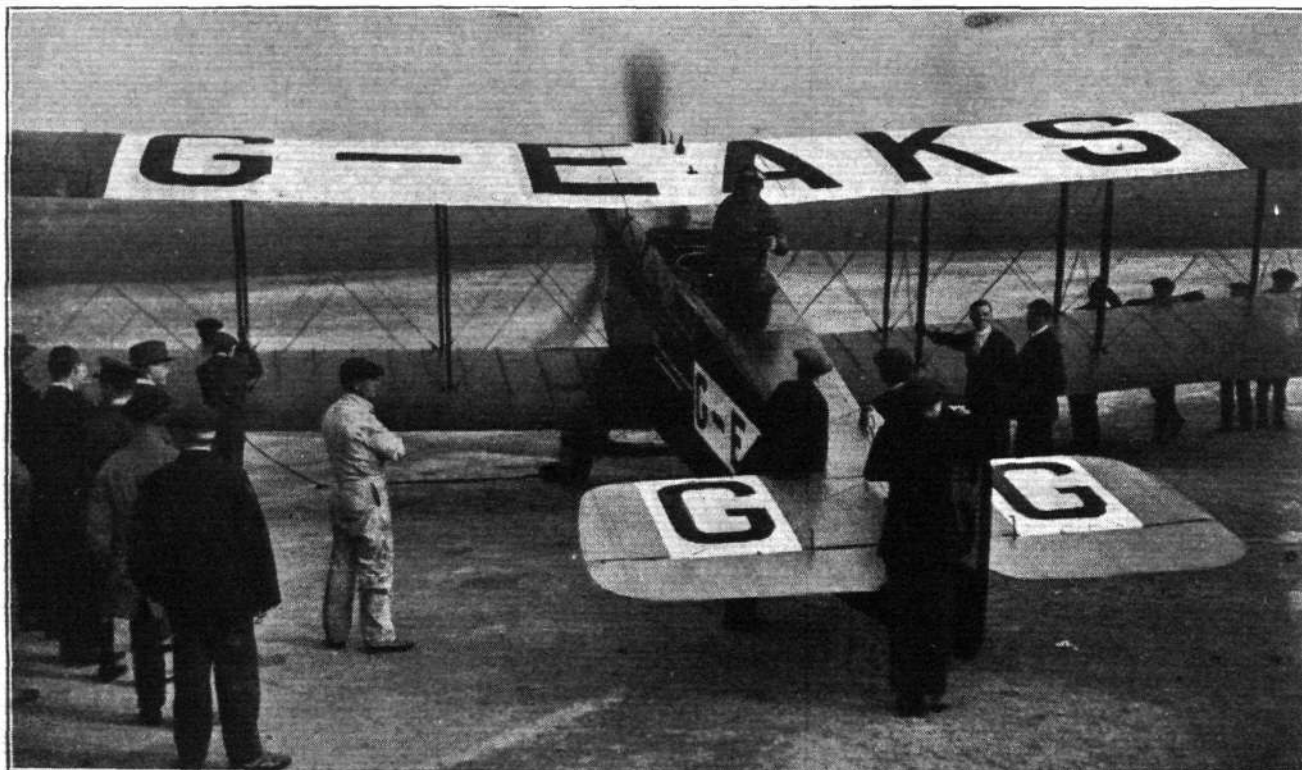


## U.S. Aviators Murdered by Mexicans.

It is announced from San Diego (Cal.), that Lieuts. Connolly and Waterhouse, two U.S. Army aviators, who were reported missing on August 21, were murdered, after being rescued, by two Mexican fishermen, at Bahia, Los Angeles, Lower California, where the aviators had alighted after losing their way during a border flight.

The identity of their slayers, who came from a Mexican sloop, is known both to the American and Mexican authorities, and a search is being made for them.

The bodies of the aviators arrived on board a destroyer on Sunday. Messages scrawled on the fuselage of the aeroplane indicated that the officers were for nineteen days without food, and were compelled to drink water from the radiator.



**LONDON-AUSTRALIA FLIGHT:** The start from Hounslow of the Sopwith-Rolls-Royce "Wallaby" on October 21. Capt. Matthews, the pilot, waving farewell



# AIRISMS FROM THE FOUR WINDS

At last a definite date—July, 1920—is announced for the great International Aero Exhibition to be held at Olympia by the Society of British Aircraft Constructors, Ltd. It promises to be the largest and most comprehensive gathering together of aircraft, aero engines, their components and accessories that has yet been organised. By the time the Show is on, there should be plenty of indication as to post-War commercial tendencies. By the official support already accorded the Exhibition success is assured beforehand, and it is likely to attract visitors from every quarter of the globe. Activities will not be confined to the halls of Olympia, as in conjunction with the indoor Exhibition provision will, it is hoped, be made for trials and demonstration flights at an aerodrome within easy distance.

By way of a reminder, past aero shows have been in the hands of the Society of Motor Manufacturers and Traders, which body, as far back as 1909, commenced to do good missionary work in this direction. Developments have been so pronounced during the War that the new body in the form of the S.B.A.C. was naturally called into existence, to look after the aircraft side of industry. Hence the change-over of the Exhibition to this latter body. The S.B.A.C. now comprises in its membership practically every British manufacturer of aircraft, aircraft engines and their component parts, accessories and materials, and this body has entered into an agreement with the Society of Motor Manufacturers and Traders under which the pre-War aero exhibitions will be continued under the joint management of the two societies. The arrangements provide for the setting-up of a joint committee to promote aero exhibitions in the United Kingdom and the use of the exhibition organisation maintained by the Society of Motor Manufacturers for the carrying out of its annual motor and other exhibitions. And so there is peace and harmony where otherwise there might easily have been unnecessary competition and a divided camp.

In this connection, another reminder is as to the opening of the Sixth International Aircraft Exhibition at the Paris Grand Palais on December 19. Close upon 200 firms have

already reserved space, many foreign countries being included in the list. Caudron, Farman, and Bréguet aeroplanes will be shown at some of the largest stands. Levasseur, Bernard, and other firms of repute will also have numerous exhibits. The Astra and Clement firms will be showing other than lighter-than-air craft, since these are not to be included in this year's exhibition. Among the Italian firms to be represented are Bianchi, Fiat, Macchi, and Caproni. British exhibitors will include Boulton and Paul, Handley Page, the Westland Aircraft Co., and British Aircraft, Ltd. A special section of the exhibition will be occupied by aerial transport firms, including "Airco," the Cie. Aérienne Française, and the Cie. Trans-aérienne.

ADMIRAL LORD JELlicoe is a consistent advocate of a strong Pacific fleet, and during his tour in Australia he has been emphasising this important Imperial project. Lord Jellicoe also maintains that Australia should become self-contained in regard to the manufacture of guns, mountings, munitions and last, but not least, aircraft. In dealing with the latter section of war equipment, Lord Jellicoe at Melbourne pointed out that war experience had shown that

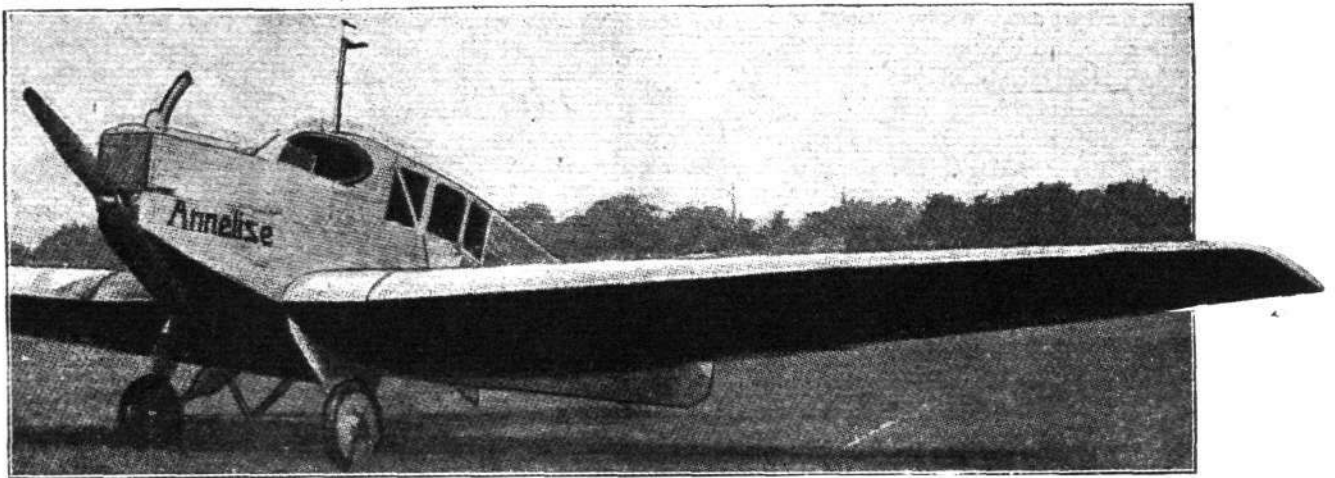
submarines can operate successfully over immense distances from their bases. This necessitated the provision against submarine attack in all parts of the Empire, while Australia must even prepare to meet attack from the air.

UPON arrival at Honolulu the other day, the greeting given Admiral Jellicoe included a squadron of aeroplanes circling round the battle-cruiser *New Zealand*.

IN one direction—tribal disturbances—the use of aircraft is being very distinctly felt and appreciated. The latest trouble on the Indian frontier is a case in point. It has been necessary to give the Waziristan natives, a tribe that was the reverse of friendly during the Afghan upset, a bit of a lesson, and, therefore, instead of throwing a large body of troops into action, the military authorities have decided to occupy only essential posts, while the real work of punishing the tribesmen will be carried out by intensive bombing from aeroplanes. Already the all-sufficient air force for this purpose is *in situ*, and preliminary



What may happen if the Income Tax continues to "zoom": Another flight to Australia. Departure of Mr. Stonie-Broke from Income Tax collector in 1925



**THE JUNKERS (GERMAN) TOURING MONOPLANE :** Three-quarter front view. This machine, which is built of metal throughout, is of the " wireless " type, having no external lift bracing. The wings are built up of tubes and covered with corrugated aluminium sheet, as is also the *fuselage*. On September 13 last this machine is said to have reached an altitude of 6,750 metres (about 22,200 ft.) with eight people on board. The engine is a 185 h.p. B.M.W. (Bavarian Motor Works). The pilot sits in front of the cabin, immediately behind the engine



**THE JUNKERS TOURING MONOPLANE :** Three-quarter rear view



The Junkers  
Touring Mono-  
plane : The cabin  
and the eight  
passengers with  
which the  
machine reached  
22,200 ft.



aerial operations have already had considerable effect on the Warra Wazirs. It is hoped that these up-to-date "persuasive" methods may prove an easy and rapid solution for all our frontier problems.

Swiss authorities are busying themselves already over International aerial regulations. Under a new law it is provided that foreign aeroplanes must land in certain specified towns on the frontier for examination by Customs officials. They must also obtain permission if they require to fly inside the country. Several other points will be submitted later to an international congress—probably held at Berne in 1920—concerning commercial and tourist aerial traffic. A suggestion, however, made by a correspondent that in view of the possibility of mountaineering by air, shares in Swiss mountain railway companies have already fallen, is, we think, straining "contingencies" a bit far.

FRANCE has decided that the cessation of War hostilities officially ceased on October 23 last. Wonder when our "Government" will make up their mind that it has happened.

ACCORDING to the *Daily Express* correspondent under date October 19 from Bombay, a party of Italian airmen are now at Bombay, waiting to proceed to other centres in connection with d'Annunzio's projected flight from Rome to Tokyo, which they expect will begin in a month's time. They say that five S.V.A. machines will attempt the flight, with the possible addition of two Caproni triplanes.

Presumably by this, d'Annunzio contemplates he will have settled the Fiume business, as he has declared that he will never leave there until Fiume is a free port under the suzerainty of Italy.

FOLLOWING the meeting in Kingsway a while back, the airship combine is now in such shape that its completion and active operations may very shortly be announced.

It was certainly a novel, if somewhat elaborate, ruse to secure a taxicab on the part of the pilot of an aeroplane, who is reported a few days back as having planed down on Farnborough Common on to the top of a passing taxicab, in which were two occupants. The taxi was crushed inwards, but no one was injured. It was rather rough on the "fares" whatever one may think of the taxi bandit, and somewhat careless of the pilot not to notice that the flag was down. But perhaps Mr. Bandit was earning a bit extra on his own, with the flag up! In which case it thoroughly served him right; at the same time, we don't think there is much money in aeroplane taxi-touting.

If any should be in doubt as to the correct thing for aeroplane "going away," some ray of light may be forthcoming from the following record of facts appearing in the *Mail* in connection with the pair-of-Rolls-Royces and set-of-sables-wedding of Miss Queenie Thomas, the British film star, and Mr. George Newman the other day. After the Carlton Hotel reception the happy couple went by car to Hounslow (did each go in one of the R.-R.'s we wonder?), from there by aeroplane to Paris, and the bride, according to the reporter, "wore a long double-breasted leather coat, brown buckskin breeches, and service laced boots to the knee. The costume was completed by a brown duvetyn cap with a thin border of red and having two peaks which could be fastened under the chin or used to give an alternative shape to the crown of the cap."

So now you know all about it.

ST. MICHAEL, the patron saint of aviators, has a special stained glass window in his honour, in the Spanish Church in Spanish Place. In this an aeroplane is depicted with the inscription "Defende Nos in Proelio."

A COUPLE of Richthofen stories appear in Count Czernin's Memoirs, extracts from which have been appearing in *The Times*. Under date February 2, 1918, Count Czernin notes the following in his Brest diary:—

"The two Richthofen brothers were here a short time ago. The elder has brought down in air fighting some 60 enemy airmen, the younger 'only' some 30. The elder has a face like that of a young and pretty girl. He told me 'how it is done.' It was, he said, quite simple; all you had to do was to get quite close to your opponent from behind and then shoot hard; the other fellow would then drop. But you had to overcome your own 'funk,' and fly quite close up to the enemy.—Modern heroes!

"Two good stories were told about the two Richthofens. The English had set a price upon the head of the elder. When he heard of this he informed them by means of leaflets from

the air that, in order to facilitate their task, from the next day forward his machine would be painted bright red, so that they might the more easily recognise him. Next morning when the squadron came out of its sheds all the machines were bright red.—One for all and all for one!

"The second story. Richthofen the younger and an Englishman were circling round each other and firing like mad at each other. They were getting closer and closer, and already they could distinguish each other's features. Suddenly something jammed in Richthofen's machine-gun, and he could not fire any more. The Englishman looked wonderingly across, and when he realised what was the matter with Richthofen he waved his hand, turned round, and flew off. Fair play! I should like to meet this Englishman and tell him that, in my eyes, he is greater than the heroes of old."

THE scramble for head and body gear after some of the aviation and other functions, which for our sins we have at times had to attend, has even upon occasion resulted in having to depart minus our hat, in spite of the most elaborate numbering "system." Apropos this, the following "Office Window" story of the other side of the picture is distinctly refreshing:—

In a West-end restaurant there is a page in charge of the cloak room, and he has never yet been known to make an error in regard to the articles entrusted to his care. He gives no tickets, but relies on an exceptionally good memory. A new customer was surprised the other evening at the alacrity with which his hat and overcoat were returned to him over the counter.

"Tell me," he begged curiously, "How do you know that these are mine?"

"I don't," answered the page.

"Then why do you hand them to me?"

"Because," said the page, "you handed them to me."



"TICKETS" AT NORTHOLT: The Central Aircraft Co. are busy out Northolt way giving passenger flights and doing school work. Our photograph shows two pupils who have just obtained their Royal Aero Club certificates. On the left is Mr. Tanner, whose actual flying time was 3 hours 15 mins., and on the right, Mr. Pool, who got his "ticket" after 3½ hours in the air. Mr. Herbert Sykes, O.B.E., who is chief instructor, is seen between his two latest pupils. The machine used is the C.A. Co.'s "Centaur 4," with Anzani engine. As each pupil is allowed 10 hours' flying, Messrs. Tanner and Pool are looking forward to nearly 7 hours' flying before leaving the school

# THE ROYAL AIR FORCE

*London Gazette, October 17*

The following temporary appointment is made at the Air Ministry:—  
*Staff Officer, 3rd Class.*—(T.) Flying Officer T. Kerr-Jones; Sept. 29.  
*Air Attache.*—Sqn. Leader J. P. C. Sewell, O.B.E.; Sept. 25.

## *Flying Branch*

Capt. N. G. Stewart-Dawson, D.S.C., to be actg. Maj. while employed as Maj. (A. and S.); May 17.  
Capt. H. L. H. Owen, A.F.C., is graded for purposes of pay and allowances as Maj. while employed as Maj. (A.); from May 1 to June 30.  
Capt. F. L. C. Butcher is graded, for purposes of pay and allowances, as Maj. while employed as Maj. (A'ship); May 1.  
Capt. (actg. Maj.) K. B. Harbord to be Capt. (A.) from (S.O.) and relinquishes the actg. rank of Maj. on ceasing to be employed as Maj.; Oct. 5, 1918 (substituted for notification in the *Gazette* of July 15 and Sept. 23).  
Lieut. W. H. Park, M.C., to be actg. Capt. while employed as Capt. (A.); May 17.

*Second Lieutenants to be Lieutenants.*—W. D. Redmond; June 1, 1917.  
R. Bretherton; Nov. 8, 1918. E. C. Crouch; Dec. 27, 1918. A. C. James; June 13.

Pilot Officer T. P. T. Jones to be Flying Officer; Sept. 14.  
Sec. Lieut. G. A. Osborne (late Gen. List, R.F.C., on prob.) is confirmed in rank as Sec. Lieut. (O.); July 10, 1918.

Sec. Lieut. L. Hudson to be Sec. Lieut., from Unemployed List; May 20, with precedence next below Sec. Lieut. T. Smith (Obs.).

Lieut. J. L. Periera relinquishes his commn. on reversion to I.A.R.O.; Oct. 9.

The following relinquish their commns. on ceasing to be employed:—  
Lieut. L. Patterson, M.C. (Lieut., R. Art.); April 11. Lieut. R. F. L. Bush (Lieut., R. Art.); May 2. Sec. Lieut. T. B. Anderson; May 9. Lieut. J. O. Leach, M.C. (half-pay list); June 28. Capt. J. Selwyn (Capt., R. Art.); Sept. 23. Capt. C. Patteson, M.C., A.F.C. (Lieut., S. Wales Bord.); Oct. 4. Sec. Lieut. S. W. P. Foster-Sutton (Lieut., E. Kent R.); Oct. 8.

(Then follow the names of 133 officers who are transfd. to the Unemployed List under various dates.)

The following Lieuts. relinquish their commns. on account of ill-health and are permitted to retain their rank:—F. B. Harland (caused by wounds); Oct. 2. D. M. Murdock (contracted on active service); Oct. 6. W. Biheller; Oct. 8.

Sec. Lieut. R. Leask (Lieut., High. L.I., T.F.) relinquishes his commn. on account of ill-health (caused by wounds), and is granted the rank of Lieut.; Oct. 6.

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—S. J. Bolitho; June 25 (substituted for notification in *Gazettes* of March 14 and July 1). W. H. Saunders (contracted on active service); July 12 (substituted for notification in *Gazette* of July 15). C. T. Skipper; Oct. 10.

Sec. Lieut. W. H. Perks resigns his commn.; Oct. 18.

Sec. Lieut. L. F. Ross is antedated in his appointment as Sec. Lieut. (A. and S.) to May 5, 1918.

Sec. Lieut. R. Nelson is antedated in his appointment as Sec. Lieut. (A. and S.) to May 26, 1918.

The initials of Flight-Lieut. P. J. H. Summer are as now described, and not P. J., as stated in *Gazette* of Sept. 26.

The rank of Lieut. T. R. Adair is as now described, and not Sec. Lieut., as stated in *Gazette* of Sept. 19.

The notification in *Gazette* of May 23 concerning Sec. Lieut. T. B. Anderson is cancelled.

The notification in *Gazette* of July 8 concerning Lieut. R. T. Percival is cancelled.

The notification in *Gazette* of July 29 concerning Sec. Lieut. H. P. Brummell is cancelled.

## *Administrative Branch*

Lieut. (Hon. Capt.) C. W. A. Millar is graded for purposes of pay and allowances as Maj. whilst employed as Maj.; Dec. 21, 1918 (substituted for notification in *Gazette* of May 27).

Capt. F. E. Hellyer, O.B.E., is graded for purposes of pay and allowances as Maj. whilst employed as Maj., from May 1 to June 24.

*Flight Lieutenants (S.O.) to be Flight Lieutenants.*—R. Belli-Bivar, M.B.E.; Sept. 9. H. B. Kavanagh, M.B.E., R. R. L. L. Thom; Sept. 22.

Lieut. F. W. H. Durrant is graded for purposes of pay and allowances as Capt. whilst employed as Capt., from (T.), from March 6 to Aug. 16 (substituted for notification in *Gazette* of Sept. 23).

Flying Officer T. Gibson to be Flying Officer from (S.O.), and is graded for purposes of pay and allowances as Flight-Lieut. whilst specially employed; Sept. 15.

Lieut. C. G. Stewart to be Lieut., from (A.); April 17.

Flying Officer J. E. Doyle, D.F.C., to be Flying Officer, from (A.); Sept. 25.

Flying Officer to be Flying Officer, from (S.O.):—J. C. Barraclough; Sept. 15. R. J. Slade; Sept. 22.

Sec. Lieut. R. R. W. Millward to be Lieut.; Aug. 21.

Pilot Officer E. Higgs to be Flying Officer; Sept. 9.

Sec. Lieut. Horace Fenn Turner to be Sec. Lieut., from (K.B.); April 17 (substituted for notification in *Gazette* of June 27 wherein this officer was described as Sec. Lieut. Horace F. Turner).

Sec. Lieut. (Hon. Capt.) F. C. Marsh (Maj., Hsrs.) relinquishes his commn. on ceasing to be employed; Oct. 11.

(Then follow the names of 26 officers who are transfd. to the Unemployed List under various dates.)

Lieut. A. B. Kinnaird relinquishes his commn. on account of ill-health, and is granted the rank of Capt.; Oct. 10.

Lieut. H. C. R. Milward (R.H.A., T.F.) relinquishes his commn. on account of ill-health (contracted on active service), and is permitted to retain his rank; Sept. 24 (substituted for the notification in the *Gazette* of Sept. 30).

The notification in the *Gazette* of Aug. 2, 1918, concerning Sec. Lieut. G. H. Tait is cancelled.

The notification in the *Gazette* of Aug. 15 concerning Sec. Lieut. W. W. Smith is cancelled.

The notification in the *Gazette* of July 8 concerning Sec. Lieut. F. A. A. Hewson is cancelled.

## *Technical Branch*

Capt. H. R. Lecomber, O.B.E., is graded for purposes of pay and allowances as Maj. while employed as Maj., Grade (A.); May 1.

Flight-Lieut. M. V. Wrigley to be Flight-Lieut., Grade (A.), from (S.O.); Aug. 1 (substituted for notification in the *Gazette* of Sept. 23).

Lieut. S. W. Bryant is graded for purposes of pay and allowances as Capt., while employed as Capt., Grade (A.); Nov. 26, 1918.

Flying Officer F. J. Cooke is graded for purposes of pay and allowances as Flight-Lieut. while employed as Flight-Lieut., Grade (B.), from (S.O.); Sept. 22.

Lieut. A. Bushfield is graded for purposes of pay and allowances as Lieut. while employed as Lieut., Grade (A.); July 1.

Flying Officer W. J. Standish is graded for purposes of pay and allowances as Flying Officer while employed as Flying Officer, Grade (A.), from Aug. 8 to Sept. 11.

Lieut. P. A. Wright to be Lieut., Grade (B.), from (Ad.); June 12.

Lieut. W. W. McDonald is graded for purposes of pay and allowances as Lieut. while employed as Lieut. (Grade (B.)); May 24.

The following Sec. Lieuts. are graded for purposes of pay and allowances as Lieuts. while employed as Lieuts., Grade (A.):—H. J. Adkins, from May 1 to Sept. 11. H. J. Dann; June 11.

Pilot Officers to be Flying Officers, without pay and allowances of that rank:—C. A. Cordeaux; Sept. 11. E. Parrett, S. A. Smith; Oct. 1.

Sec. Lieuts. (Ad.) to be Sec. Lieuts., Grade (A.):—E. T. Fielding; Nov. 28, 1918. L. T. Bulmer; March 20.

(Then follow the names of 34 officers who are transfd. to the Unemployed List under various dates.)

Capt. (actg. Maj.) D. G. Nairn, O.B.E. (R.A.S.C., T.F.), relinquishes his commn. on account of ill-health, and is permitted to retain the rank of Maj.; April 26 (substituted for notification in the *Gazette* of April 25).

The notification in the *Gazette* of April 29 concerning Sec. Lieut. C. W. O'Brien is cancelled.

## *Medical Branch*

Lieut.-Col. G. N. Biggs (Maj., R.A.M.C., T.F.), from Unemployed List, to be restored to establishment without pay and allowances of his rank; Aug. 13.

Flying Officer R. G. J. McCullagh to be Flight-Lieut.; Aug. 14.

*Transferred to Unemployed List.*—Capt. W. P. Whippell; April 28. Maj. (actg. Lieut.-Col.) J. L. Birley, O.B.E.; Oct. 7. Maj. (actg. Lieut.-Col.) H. C. T. Langdon, O.B.E.; Oct. 10.

## *Dental Branch*

Flying Officer L. Wigoder to be Flight-Lieut.; Oct. 7.

Capt. R. Fyson is transfd. to Unemployed List; Sept. 20.

## *Memoranda*

Pilot Officer W. J. Bray to be Flying Officer; Oct. 1.

(Then follow the names of 23 cadets who are granted hon. commns. as Sec. Lieuts.)

The following temp. Hon. Lieuts. relinquish their commns. on ceasing to be employed:—K. N. Barnes, A. J. Bohringer, F. E. Coles, F. J. Crinane, F. A. Crouch, C. H. Grace, H. Petrie, W. A. Pett, W. W. Purves, R. E. Tiffin; Sept. 16.

The notifications in the *Gazette* of Aug. 26 concerning the following officers are cancelled:—Sec. Lieut. M. L. Bisson, Sec. Lieut. J. H. F. Hock, Sec. Lieut. G. T. Horne, Sec. Lieut. W. E. May, Sec. Lieut. E. Moorland, Sec. Lieut. L. M. Montgomery, Sec. Lieut. S. J. Livingstone.

## *Permanent Commissions.*

The notification appearing in *Gazette* of Aug. 1 appointing the following officers to permanent commns. is cancelled:—Maj. T. S. Impey (A.), Maj. J. S. Mills, D.S.C. (A.), Maj. E. H. M. O'Farrell (A.), Capt. H. F. Delarne, D.F.C. (A.), Capt. C. T. MacLaren, O.B.E. (A.), Capt. E. M. Pollard (A.), Capt. G. T. Porter (A.), Lieut. H. de V. Leigh, D.S.C. (A.), Lieut. J. F. Nalder (Ad.), Lt. T. Roberts (A.), Lieut. J. S. C. Robinson (O.).

The notification in *Gazette* of Aug. 22 appointing Lieut.-Col. O. H. K. Maguire, D.S.O. (A.) to a permanent commn. is cancelled.

The initials of Maj. P. R. Burchell are as now described, and not "R. P.," as stated in *Gazette* of Aug. 1.

The surname of Lt. C. C. Bazell is as now described, and not "Bazzell," as stated in *Gazette* of Aug. 1.

The notification in *Gazette* of Sept. 5 concerning Capt. F. E. P. Barrington is cancelled (the notification in *Gazette* of Aug. 1 is to stand).

The name of Lieut. M. Minter is as now described, and not Lieut. M. Minter, M.C., as stated in *Gazette* of Aug. 1.

The name of Capt. C. H. Elliott-Smith is as now described, and not Capt. C. H. Elliott-Smith, M.C., as stated in *Gazette* of Aug. 1.

The classification of Lieut. A. S. Thompson is (Ad.) and not (A.) as stated in the *Gazette* of Aug. 1.

The date of appointment of Lieut. J. Whitford to a permanent commn. is Aug. 16, and not "Aug. 1" as stated in the *Gazette* of Aug. 1.

The following temp. appointments are made at the Air Ministry:—  
*Staff Officers, 1st Class.*—(Air.)—Maj. G. J. Watney; March 25; and to be actg. Lieut.-Col. until April 30. (Substituted for the notification in the *Gazette* of June 20.)

*Staff Officer, 2nd Class.*—(Air.)—Capt. W. E. G. Bryant; March 25; and to be actg. Maj. until April 30. (Substituted for the notification in the *Gazette* of June 20.)

The following temp. appointments are made:—  
*Staff Officer, 2nd Class.*—(T.)—Sqn. Leader F. Jolly (from Aug. 15 to Sept. 19).

*Staff Officers, 3rd Class.*—(Air.)—Flying Officer (actg. Flight Lieut.) O. R. Gayford, and relinquishes the actg. rank of Flight Lt.; Sept. 22.—(P.) Flight Lieut. A. McR. Moffatt; Oct. 13.—(Q.) Sec. Lieut. W. A. Glasper; June 12.

## *Flying Branch.*

Wing-Comdr. I. T. Courtney, C.B.E., to be Wing-Comdr. (A.) from (S.O.); Oct. 1.

Sqn. Leader Sir N. A. R. D. Leslie, Bart., C.B.E., to be Sqn. Leader (A.), from Air Attache; Sept. 25.

Flight Lieut. D. S. Earp to be actg. Sqn. Leader whilst empld. as Sqn. Leader (O.); Aug. 1 to Oct. 11.

Capt. M. Henderson, D.S.O., is graded for purposes of pay and allowances, as Maj. whilst empld. as Maj. (A.); from June 17 to July 31.

Flight Lieut. H. I. Hammer, D.F.C., to be Flight Lieut. (O.), from (S.O.); Sept. 1.

Lieut. R. E. Butler to be actg. Capt. whilst empld. as Capt. (A.); from Dec. 1, 1919, to April 25.

The following Lieuts. are graded for purposes of pay and allowances as Capts. whilst empld. as Capts. (A.):—R. S. Capon; to July 31. L. C. Pockney; May 1. W. Jones; June 13.

Lieut. F. R. Hockney relinquishes the grading for pay and allowances as Capt. on ceasing to be empld. as Capt. (A.); June 3.

The following Flying Officers relinquish the grading for pay and allowances as Flight Lieuts. on ceasing to be empld. as Flight Lieuts. (A.):—A. A.



Leitch, M.C., D.F.C.; Sept. 5. W. S. Reid; Sept. 6. E. W. White; Sept. 25.

The following Flying Officers actg. Flight Lieuts. relinquish the actg. rank of Flight Lieut. on ceasing to be empld. as Flight Lieuts. (A.):—(Hon. Flight Lieut.) L. N. Sutherland; Sept. 1. L. Clarke; Sept. 4. A. J. C. Styran, M.C.; Sept. 19.

Flying Officer V. Stranders to be Flying Officer from (S.O.); Sept. 8. Sec. Lieuts. to be Lieuts.:—(Hon. Lieut.) G. E. Clavey; July 22, 1918. A. J. Rankin; Sept. 10, 1918. E. E. Taylor; Oct. 13, 1918. W. E. J. Bloodworth; Sept. 27, 1918. S. T. Crowe (since reclassified to Admin.); April 25. W. J. Millen; June 30. P. F. O. F. B. Candy (late R.N.A.S.) is granted a temp. commn. as Sec. Lieut. (A. and S.); Sept. 27, 1918.

The following relinquish their commns. on ceasing to be empld.:—Capt. (Capt., R.W. Surr. R.) L. M. Boddam-Whetam, from (S.O.); Aug. 28. Sec. Lieut. L. E. G. Judge (Sec. Lieut., L.N. Lancs. R.); Aug. 29. Sec. Lieut. D. W. Clarke (Lieut., R.F.A.); Sept. 17. Maj. G. Henderson (Maj., Indian Army); Sept. 18. Lieut. E. V. C. Hamilton (Lieut., Worc. R.); Sept. 19. Lieut. R. G. Lewis (Lieut., S. Wales Bord.); Sept. 20. Lieut. (Hon. Capt.) H. A. Courtenay, D.F.C. (Capt., R.A.S.C.); Lieut. P. Gurrey (Lieut. Suff. R.); Sept. 25. Lieut. Hon. Capt. C. F. Yarde (Capt., R.A.S.C.); Sept. 26. Lieut. A. C. Jelf (Sub-Lieut., R.N.); Oct. 1. Capt. A. Howe (Capt., R.W. Kent R.); Oct. 4. Capt. D. R. Hanlon (Capt., R.G.A.); Oct. 7. Lieut. E. E. S. Wheatley (R.W. Surr. R.); Oct. 9. Lieut. E. V. A. Bell (Lieut., Hamps. R.); Oct. 13. Lieut. C. G. Stewart (Lieut., R. Scots Fus.); Oct. 14. Lieut. (Hon. Capt.) T. A. Francis (Capt., R. Ir. Regt.); Oct. 15.

(Then follow the names of 141 officers who are transfd. to the Unemployed List under various dates.)

Capt. C. H. Brewer, M.C., relinquishes his commn. on account of ill-health caused by wounds, and is permitted to retain his rank; Oct. 13.

The following Lieuts. relinquish their commns. on account of ill-health and are permitted to retain their rank:—T. G. Drew-Brook (caused by wounds); Sept. 30. E. H. Stanes, M.C. (Manch. R.); C. B. Whitney (contracted on active service); Oct. 14. A. B. E. Graham; Oct. 22.

The following Sec. Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—E. L. Milborrow (contracted on active service); Oct. 10. V. L. Watts (caused by wounds); Oct. 11.

The surname of Sec. Lieut. L. A. Robertson is as now described, and not "Robertson," as stated in *Gazette* of Sept. 26.

The initials of Sec. Lieut. R. C. Adams are as now described, and not "F. C." as stated in the *Gazette* of Sept. 26.

The surname of Sec. Lieut. R. J. Ottaway-Wilson is as now described and not R. J. O. "Wilson" as stated in the *Gazette* of Feb. 21.

The notification in the *Gazette* of June 17 concerning Sec. Lieut. J. H. Taylor refers to "John Homes Taylor."

The notification in the *Gazette* of March 11 concerning Lieut. W. Green (E. Yorks. R.) is cancelled.

The notification in the *Gazette* of March 25 concerning Lieut. P. H. Clarke is cancelled.

The notification in the *Gazette* of July 25 concerning Sec. Lieut. F. C. Logan is cancelled.

The notification in the *Gazette* of Aug. 19 concerning Sec. Lieut. H. Toms is cancelled.

The notification in the *Gazette* of Oct. 3 concerning Sec. Lieut. F. W. F. Turner is cancelled.

#### Administrative Branch

Group Capt. T. B. Wood, C.M.G., to be Group Capt., from (S.O.); Oct. 1. Sqdn. Leader A. C. E. S. Bowlby relinquishes the grading for pay and allowances as Wing Com. on ceasing to be empld. as Wing Com.; Sept. 12. Sqdn. Leader A. ap Ellis to be Sqdn. Leader, from (S.O.); Oct. 1.

Flight Lieuts. to be Flight Lieuts., from (S.O.):—E. D. Cole, F. J. Wise; Aug. 15. C. C. Treatt; Sept. 1. H. A. J. Wilson, O.B.E.; Sept. 22.

Lieut. A. B. Monk to be actg. Capt. while empld. as Capt., from Oct. 4, 1918, to April 30 (substituted for the notification in the *Gazette* of March 25 and May 23).

The following Lieuts. are graded for the purposes of pay and allowances as Capt. while empld. as Capt.:—Lieut. S. F. A. Welsh; April 2. Lieut. J. Woolfenden; May 1 to July 25.

Lieuts. to be Lieuts.:—R. W. Silk, from (O.); May 12 (substituted for the notification in the *Gazette* of June 10. J. E. Drummond, from (A.); July 25. Flying Officers to be Flying Officers:—R. B. Luard, from (A.); Sept. 8. F. Dance, M.B.E., from (S.O.); Oct. 10.

The following Flying Officers relinquish the grading for pay and allowances as Flight Lieuts. on ceasing to be empld. as Flight Lieuts.:—W. E. N. Growden; Aug. 20. C. A. Howe; Aug. 26.

Flying Officer (actg. Sqdn. Leader) G. B. Redgrave relinquishes the actg. rank of Sqdn. Leader and the grading for pay and allowances as Flight Lieut.; Sept. 12.

Sec. Lieuts. to be Lieuts.:—R. P. Briscoe; Dec. 27, 1918. R. C. Rogers; June 6.

The following Sec. Lieuts. are graded for purposes of pay and allowances as Lieuts. whilst empld. as Lieuts.:—J. G. Le Brun (to Sept. 23), T. Surr (to July 14); May 1.

Pilot Officer G. P. Abbott relinquishes the grading for pay and allowances as Flight Lieut. on ceasing to be empld. as Flight Lieut.; Sept. 3.

Lieut. C. L. Munday, M.C. (Lieut., R. Fus.), relinquishes his commn. on ceasing to be empld.; Sept. 30.

(Then follow the names of 23 officers who are transfd. to the Unemployed List under various dates.)

Lieut. F. W. Dogherty relinquishes his commn. on account of ill-health, and is permitted to retain his rank (Oct. 22).

The following 2nd Lieuts. relinquish their commns. on account of ill-health, and are permitted to retain their rank:—F. C. Logan; (July 10). W. D. Layton (contracted on active service); (Oct. 14). J. O. Minshall (caused by wounds); (Oct. 15).

The surname of 2nd Lieut. J. H. Gray is as now described and not Grey as stated in *Gazette* Sept. 26.

The notification in *Gazette* of April 29 concerning Lieut. A. H. F. Brothers is cancelled.

#### Technical Branch

Maj. R. G. L. Markham is graded for purposes of pay and allowances as Lieut.-Col. whilst empld. as Lieut.-Col., Grade (A) (May 1).

Maj. H. E. Day, D.S.O., M.V.O., to be Maj., Grade (B), from (S.O.) (July 21) substituted for the notification in *Gazette* of Aug. 1.

Capt. C. B. Dalison is graded for purposes of pay and allowances as Maj. whilst empld. as Maj., Grade (A), from (A. and S.) (May 1).

Capt. W. S. Hammond, O.B.E., is graded for purposes of pay and allowances as Maj. whilst empld. as Maj., Grade (A.) (May 1).

Lieut. G. S. Hallas, M.C., is graded for purposes of pay and allowances as Maj. whilst empld. as Maj., Grade (A) (June 9).

Flight Lieuts. to be Flight Lieuts.:—N. H. Wood, Grade (A), from (S.O.) (Sept. 8). H. J. Lister, Grade (B.), from (S.O.); (Aug. 15). Lieut. W. T. Hope-Hawkins to be actg. Capt. whilst empld. as Capt., Grade (A.); (April 1, 1918).

The following Lieuts. are graded for purposes of pay and allowances as Capt. whilst empld. as Capt., Grade (A.):—G. Baillie, C. E. Nightingale, J. H. Mackie, P. H. Paul, A. G. Ridgon (May 1).

Lieut. F. R. Wilkins is graded for purposes of pay and allowances as Capt. whilst empld. as Capt., Grade (A), from (Ad.) (May 1).

Lieut. H. B. Hawker is graded for purposes of pay and allowances as Capt. whilst empld. as Capt., Grade (B) (June 12).

Flying Officer F. J. Cooke is graded for purposes of pay and allowances as Flight Lieut. whilst empld. as Flight Lieut., Grade (B), from (S.O.) (Sept. 22).

2nd Lieut. (Hon. Capt.) F. C. Marsh is graded for purposes of pay and allowances as Capt. whilst empld. as Capt., Grade (B.) (May 1).

Lieut. A. J. McNab, M.C., to be Lieut., Grade (A.), from Grade (B.) (June 25, 1918).

Flying Officer C. G. Wigglesworth, R.F.C., to be Flying Officer, Grade (A.), from (Airship) (Sept. 8).

Flying Officer S. Empsall relinquishes the grading pay and allowances as Flight Lieut. on ceasing to be empld. as Flight Lieut., Grade (A.), (Sept. 8).

Lieut. R. J. Copley relinquishes the grading pay and allowances as Capt. on ceasing to be empld. as Capt., Grade (B) (June 11).

Lieut. A. J. McNab, M.C., to be Lieut., Grade (B.), from (O.) (April 27, 1918).

Flying Officer T. H. Sills to be Flying Officer, from (S.O.) (Sept. 30).

2nd Lieuts. to be Lieuts.:—R. W. Ellis (Sept. 28, 1918 (substituted for notification in *Gazette*, March 7); H. Edwards (May 14).

2nd Lieuts. to be Lieuts., without the pay and allowances of that rank:—M. Thomson; (June 11, 1918). F. E. P. Langdon; (Oct. 5, 1918). A. West; (Dec. 4, 1918) (substituted for notification in *Gazette* of Mar. 7).

Pilot Officers to be Flying Officers, without pay and allowances of that rank:—H. S. Whitley; (Aug. 5). G. A. Slater; (Aug. 27).

The following 2nd Lieuts. are graded for purposes of pay and allowances as Lieuts. whilst empld. as Lieuts., Grade (A.):—W. Dentith; (to Sept. 22). J. Driscoll, A. A. Gardner, J. G. Wright; (May 1).

Pilot Officer (Hon. Flying Officer) J. C. Dyson to be Pilot Officer, Grade (B.), from (S.O.) (Sept. 29), and to be Hon. Flying Officer.

2nd Lieut. (Hon. Capt.) F. C. Marsh to be 2nd Lieut., Grade (B.), from (Ad.) (May 1), and to be Hon. Capt.

2nd Lieut. H. Royston (late Gen. List, R.F.C., on prob.) is confirmed in rank as 2nd Lieut., Grade (B.) (Oct. 21, 1918) (substituted for notification in *Gazette* of Dec. 20, 1918, wherein this officer was shown under (Admin. Branch).

(Then follow the names of 57 officers who are transfd. to the Unemployed List under various dates.)

Lieut. T. J. Stannage relinquishes his commn. on account of ill-health, and is permitted to retain his rank (Aug. 1). (Substituted for notification in the *Gazette* of Sept. 2).

The notification in the *Gazette* of April 29 concerning Lieut. W. T. Hope-Hawkins is cancelled.

The notification in the *Gazette* of Feb. 14 concerning Lieut. W. T. H. Hawkins is cancelled.

The notification in the *Gazette* of Aug. 26 concerning Lieut. P. Cairn is cancelled.

The notification in the *Gazette* of Oct. 7 concerning Lieut. P. Cairns is cancelled.

The notification in the *Gazette* of July 8 concerning 2nd Lieut. E. H. Halley is cancelled.

The notification in the *Gazette* of July 25 concerning 2nd Lieut. F. C. Logan is cancelled.

The notifications in the *Gazette* of May 24, 1918; Oct. 22, 1918; and June 27 concerning Lieut. A. J. McNab, M.C., are cancelled.

The notification in the *Gazette* of Sept. 12 concerning 2nd Lieut. A. G. Ridgon is cancelled.

#### Medical Branch

Capt. H. Harvey to be actg. Maj. while empld. as Maj. (July 28).

Capt. R. B. Lilly is transferred to unempld. list (Sept. 16).

#### Dental Branch

The surname of Lieut. B. H. Moore is as now described and not "More" as stated in the *Gazette* of Aug. 8.

#### Memoranda

Lieut. A. C. W. Williams is granted the hon. rank of Capt. (Aug. 16, 1918).

The following Probationary Flight Officers are granted Hon. Commns. as 2nd Lieuts.:—F. A. Lewis; (Nov. 21, 1918). G. N. S. Lane; (April 24). J. R. F. Cheese; (Mar. 8). J. S. Stauffer; (Sept. 28).

The following relinquish their commns. on ceasing to be empld.:—Capt. A. Warnock (Capt. and Qmr., Ox. and Bucks L.I.); (Oct. 3). Maj. R. Money, O.B.E. (K.O.R. Lancs R.); (Oct. 9). Lieut. A. V. Burbury, M.C. (Lieut., Yorks. R.); (Oct. 14). Temp. Hon. Lieut. H. Clark (Sept. 16).

(Then follow the names of 6 officers who are transfd. to the Unemployed List under various dates.)

The notification in the *Gazette* of Sept. 5 concerning Flight Lieut. C. E. Hodgson is cancelled.



### The Great Northern Aerial Syndicate, Ltd.

FROM the Secretary of the Great Northern Aerial Syndicate, Ltd., we have received a copy of the prospectus of the parent company. There has been no necessity to issue an invitation to the public for subscriptions, the directors and their friends having taken up a substantial holding of the capital of £10,000. Later on it is proposed to form subsidiary companies for working the aerial schemes planned by the parent company. The document to hand is a straightforward bid for popularising the use of airships in preference to aeroplanes, and from the details set out in this preliminary prospectus of obligations and options already entered upon,

with sound commercial management there should be every reason why the undertaking should succeed. Some little time ago we published short particulars of the districts contemplated to be covered by this enterprise radiating from Liverpool and other important west coast towns to the Isle of Man and the leading coast cities of Ireland, besides comprising inland flying routes to the east coast. When the parent company has more fully matured its campaign we shall hope to give fuller details of its ambitious and praiseworthy projects. The offices of the company are at 25, Lord Street, Liverpool, and the Secretary is Mr. W. E. Cooke.

## SIDE-WINDS

FOLLOWING on the acquisition by Sir W. G. Armstrong, Whitworth and Co., Ltd., of a large interest in the Siddeley-Deasy Motor Car Co., Ltd., of Coventry, the name of the latter is changed to Armstrong Siddeley Motors, Ltd. New London premises are being opened at 10, Old Bond Street, W. 1.

ON Thursday, October 23, the B.A.T. commercial machine, piloted by Mr. Cyril Turner, left Hounslow for Amsterdam, at which city he arrived in 2 hours and 40 minutes. Maj. C. Draper, D.S.C., flew a B.A.T. "Bantam" fitted with a 200 h.p. Wasp engine from Hendon to Cowes in the morning, returning in the afternoon in 35 minutes. On Saturday, October 25, Maj. C. Draper piloted a B.A.T. saloon passenger machine with a full complement of passengers to Amsterdam. This trip was in addition to the regular service, but the demand for aerial transport to Holland is now growing, and it may be necessary to put on this service two machines per week instead of one.

DURING the week ending October 22 Handley Page Transport Ltd., in conjunction with Messageries Aeriennes, Paris, on their London-Paris Service carried 47 passengers and 2,184 lbs. of freight. A picture valued at £500 was carried on one of the machines. A return journey to Paris was made in one day, occupying altogether 6 hrs. 40 mins. actual flying, Lieut. McIntosh piloting the machine. During the same week 19 passengers were carried between London and Brussels.

THE Airco aeroplanes between London and Paris had, at the completion of their ninth week, flown 34,000 miles at an average of 106 m.p.h. The "air expresses" had then accomplished successfully 135 of their 139 scheduled flights. Only one flight was prevented by weather, one interrupted by weather, and two interrupted by mechanical trouble. On 37 out of the 54 flying days the weather was unfavourable for flying.

## COMPANY MATTERS

### Wolseley Motors, Ltd.

A MEETING of holders of the 5 per cent. first mortgage debenture stock of Wolseley Motors, Ltd., was held on October 20 for the purpose of considering resolutions proposing that the 5 per cent. first mortgage debenture stock be exchanged for 6½ per cent. first mortgage debenture stock, forming part of an issue of debenture stock for £1,700,000.

Sir Vincent Caillard (chairman of the company), who presided, explained that the directors had come to the conclusion that in view of the rapid development which had taken place in the company's manufacturing capacity during the past five years, the time had arrived when a complete reorganisation of the company's finances was necessary. In order to enable the company to make the best possible use of the extensive additions which had been carried out during the War, it was necessary that further additions to the buildings and plant should be made, so as to balance the equipment of the shops, with that effected during the War, to bring them up to their maximum capacity.

In order to carry this into effect it will be necessary to take the following steps:—(1) To balance the machinery in the machine shops so as to bring every section up to the required standard for the programme on which the directors have decided. (2) To provide additional factory space for assembling and erecting purposes. A large portion of the space which was used for this purpose in the past has been absorbed during the War for the installation of additional machinery. (3) To extend the company's body manufacturing, painting, trimming, and finishing shops, which have not undergone any extension during the War.

Some of the extensions are in hand, and every effort will be made to complete the remainder as soon as possible.

Sir Vincent Caillard, in outlining the programme of the company, said that there would be three models:—The "Wolseley" Ten—a four-cylindrical model, developed from the Stellite, to be sold as a two- or four-seater; the 15 h.p. four-cylindrical four-seater, to be produced in large quantities, and the 20 h.p. six-cylindrical car, to be fitted with examples of the best types of carriage work.

After explaining the financial resolutions, Sir Vincent Caillard expressed the appreciation of the London directors of the excellent services rendered to the company by the Birmingham directors and the staff.

Mr. Ernest Hopwood seconded the resolutions, which were duly carried.

## PUBLICATIONS RECEIVED

*The Thermionic Valve and Its Development in Radiotelegraphy and Telephony.* By J. A. Fleming, M.A., D.Sc., F.R.S. London: The Wireless Press, 12-13, Henrietta Street, W.C. 2. Price 15s. net.

*Transport by Aircraft.* The English Electric Co., Ltd., Phoenix Works, Thornbury, Bradford.

*The American Air Service.* By A. Sweetser. London: D. Appleton and Co., 25, Bedford Street, W.C. 2. Price 10s. 6d. net.

*Baby: From Bud to Blossom.* By Mrs. J. Langton Hewer. London: The Eagle, Star and British Dominions Insurance Co., Ltd., British Dominions House, Royal Exchange Avenue, E.C.

*The Struggle in the Air, 1914-1918.* By Maj. C. C. Turner (late R.A.F.). London: Edward Arnold. Price 15s. net.

*Wolseley Motors, Ltd., on War Service.* Wolseley Motors, Ltd., Adderley Park, Birmingham.

*The Birthplace of Aerial Power.* The Grahame-White Co., Ltd., The London Aerodrome, Hendon, N.W. 9.

*The Seventh Vial.* By Frederick Sleath. London: Herbert Jenkins, Ltd., York Street, St. James's, S.W. Price 6s. net.

### Catalogues

*Electric Fans.* The Sun Electrical Co., Ltd., 57-59, Neal Street, Long Acre, W.C. 2.

*Steel Wire Ropes, Aircraft Wires and Fittings, etc.* Brunton's Wire Mills, Musselburgh, Scotland.

*Avro Aeroplanes for Commerce, Sporting and Private Purposes.* A. V. Roe and Co., Ltd., Newton Heath, Manchester.

## AERONAUTICAL SPECIFICATIONS PUBLISHED

Abbreviations:—cyl.=cylinder; I.C.=internal combustion; m.=motors.

### APPLIED FOR IN 1917

The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

Published October 30, 1919

- 1,286. L. GOLDMERSTEIN. Aeroplanes. (130,060.)
- 6,002. SPERRY GYROSCOPE CO. Gyroscopic stabilisers. (133,067.)
- 7,035. G. CAPRONI. Multiplane aeroplanes. (133,068.)
- 13,897. G. POMILIO. Guns mounted on aircraft. (133,078.)
- 16,364. G. CAPRONI. Carburettors. (133,085.)

### APPLIED FOR IN 1918

Published October 30, 1919

- 508. L. AVORIO. Captive balloons. (133,087.)
- 2,629. G. E. BRADSHAW and A.B.C. MOTORS, LTD. Means for securing bolts, studs, etc. (133,093.)
- 12,385. GOODYEAR TIRE AND RUBBER CO. Kite balloons. (133,112.)
- 13,265. E. G. CLEVERLEY. Suspension of flares, etc., from kite balloons. (133,115.)
- 16,040. S. C. MARTIN. Valve-operation indicators for rotary I.C. engines. (133,151.)
- 18,199. G. AYLING. Strut, spar, etc., construction. (133,205.)

### APPLIED FOR IN 1919

Published October 30, 1919

- 6,678. J. D. MOLESWORTH. Scenic railways for training of airmen, etc. (133,252.)
- 13,335. H. MIDDLETON. Non-recoil guns for aerial warships, etc. (133,273.)

If you require anything pertaining to aviation, study "FLIGHT'S" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages xli, xlii, xliii, and xliiv).

## NOTICE TO ADVERTISERS

All Advertisement Copy and Blocks must be delivered at the Offices of "FLIGHT," 36, Great Queen Street, Kingsway, W.C. 2, not later than 12 o'clock on Saturday in each week for the following week's issue.

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